The
Geographical Journal.

No. 2. FEBRUARY, 1899. Vol. XIII.

EXPLORATION IN THE CAROLINE ISLANDS.*

By F. W. CHRISTIAN.

The extensive Caroline archipelago stretches for over 1500 miles from Yap in the west, to Kusaie in the east, and lies north of New Guinea (between lat. 5° to 10° N., and long. 137° 30′ and 163° 10′ E.). It is a collection of low coral atolls, with a sprinkling of basalt islands enclosed by barrier reefs. These and other coralline groups so thickly stud the waters hereabouts, that geographers have given this portion of the Pacific the name of Micronesia—the region of the little islands. The Marianne or Ladrone group, practically a prolongation of the Japanese chain, is not properly reckoned in the Micronesian area. The Caroline archipelago is composed of thirty-six minor groups, of which the following are the principal: Yap, Uluthi, Uleai, Namonuito, Pulawat, Ruk, the Mortlocks, Ponape, and Kusaie. Altogether there are 680 islets and islands, for the most part sparsely inhabited, the population probably not exceeding 50,000, an odd medley of the black, brown, and yellow races. It is a curious fact that, although Yap lies some 1500 miles nearer India and the Malay archipelago than Ponape, the westernmost islanders are much the darker and their language the more strange and barbarous. The great stream of Polynesian migration has flowed past further southward. Yet the dialect of Uluthi to the north of Yap, like that of the central Carolines, has a considerable Polynesian infiltration. These jagged or indented areas of speech are a peculiar puzzle to the philologist, showing a very irregular distribution of race-mixture. The islanders of Uleai, Lamotrek, Ifalik, and Satawal are closely allied in speech, customs, and traditions to those of Uluthi.

* Paper read at the Royal Geographical Society, December 12, 1898. Map, p. 224.

The islands in the great lagoon of Hogolu or Ruk, further to the eastward, are occupied by two mutually hostile races, the black and the brown, who are constantly at war with one another. Next to Ruk are the Mortlock islands, divided into three minor groups, of which Lukunor is the largest and most populous. The Mortlock dialect is the Lingua Franca, or commercial language of the archipelago, furnishing a most complete key to the bizarre dialects that cover this extreme area. South of the Mortlocks, and about 100 miles north of the line, are two interesting little coralline groups named Nuku-Or and Kap-in-Mailang, or Kap-en-Marangi. On these is spoken a language, a remarkable monument of pure and archaic Polynesian, combining the phonesis of Tahitian and Samoan, with a sprinkling of later Malayan. The coralline islands, which form by far the larger proportion of the Caroline group, rarely rise more than 20 or 30 feet above the sea; but the islands of mingled basaltic and limestone formation, such as Yap in the west, Ruk in the centre, Lukunor a little to the east, and Ponape and Kusaie in the extreme east, rise to an altitude varying from 600 to nearly 3000 feet. The special interest attaching to these little spots is fourfold—

1. To the geographer, because the group affords some interesting studies in the formation of coral reefs found in all stages of development, and the presence of columnar and cellular basalt.

2. To the student of history, for the trouble that arose in 1886 between Spain and Germany over the possession of the Carolines, with their trading possibilities.

3. To the archæologist, for the existence of certain massive structures of stone upon the islands of Ponape and Kusaie, to the eastward of the chain.

4. To the philologist, for the study of many curious native dialects hitherto unclassified, the distribution of which shows clearly the steady progress eastward and southward of the so-called Malayo-Polynesian nations, illustrating a singular race fusion worked out for many centuries past between trader, explorer, fugitive, castaway, exile, and pirate—streams of overlapping populations flowing wave upon wave, backwater, eddy, and counter-current.

I will refer briefly to the principal explorers who have visited these waters.

In 1528, Alvaro de Saavedra discovered the Uluthi or Mackenzie group, and took possession of them in the name of Spain. A little later he sailed into the wide lagoon of Hogolu, or Ruk, and in the September of the next year he found Ualan, or Kusaie. After him Villalobos and Legaspi, on their way to the Philippines from New Spain, made fresh discoveries in these waters, of which Yap was the most important.

In 1595, the famous sea-captain Quirós fell in with Ngatik, to the south of Ponape, which he called Los Valientes, from the warlike character of the natives he found there. A series of expeditions of a religious character followed the Spanish discoveries in these seas.

Attempts to introduce the Catholic faith on Sonsorol and the Enderby group, known as Los Martires, failed disastrously, ending in the death of the missionaries who conducted them, through the cowardice and incompetence of the captain who held temporal command. Other Spanish vessels, no doubt, on the course from Acapulco to the Philippines, may have fallen in with some of the Caroline islands or been wrecked on some of the uncharted reefs. Of these we have no record save the grim story on the south coast of Ponape, of iron men who came up out of the sea and fought with the men of Kiti, until overwhelmed with sling-stones and spear-thrusts. A voyager of note in Micronesia was Kotzebue, who, with the famous Chamisso, poet, dramatist, and philologist, visited the Marshalls, the Mariannes, and a portion of the Carolines in 1815. After 1819, Lutke, Freycinet, Duperrey, and Dumont D'Urville visited these regions. In 1839, an English man-of-war, the *Larne*, coasted around Ponape and entered Kiti harbour. A number of geographical observations and soundings were taken, upon which our present Admiralty chart is based. Most unfortunately, nearly all the native names have been cruelly mangled, and have become a meaningless jargon.

Dr. J. S. Kubary—now unhappily deceased—made some interesting researches amongst the Mortlock islanders, and supplied new information on the bird-life of Ponape. He also furnished the Godefroy firm at Hamburg with some notes on the ruins of Metalanim. When I met him he was living at Inpompo, on the south bank of the Pillap-en-Chakola creek, a little way above the colony of Santiago. He was then busily engaged collecting land-shells and specimens of birds of the island, one of which, a *Phlegyas*, was called after him. I did not have the pleasure of seeing the beautiful views he took of Nan-Matal in 1874, or of examining in detail his writings on the ruins of Metalanim. He, however, let me have the plan of the ruins of Nan-Matal, of which I have made use, making a good many corrections in the names and a little in the position of the islets, from the information given by some natives and an old American settler and his son, who accompanied me. Before my visit to Metalanim, Kubary promised to give me a full account on my return, so that I could have the satisfaction of working independently. When I came back he told me a good deal more about his work, and we had very interesting discussions together. Strangely enough, he had not made any excavations in the central vault, which he had used as a developing-chamber for his negatives, and was delighted when I spread my finds before him. As an instance of the thoroughness of his methods, I refer to the sketch-plan of Nan-Tauach, at p. 8 of the paper on Kubary's researches by Dr. Friedrichsen, "Die Ruinen von Nan-Matal," published in Hamburg in 1874, in the journals of the Museum Godeffroy, which has done so much for science in Pacific waters. A little while after my departure from Ponape, I received a letter at Yap telling me of Kubary's death, which occurred only two days after

my departure. He was one of the most indefatigable scientists that Germany has sent out into Pacific waters, and was much missed by all who knew him.

During his cruises in the Pacific in 1882–85, Admiral Cyprian Bridge visited the Carolines (*Proceedings, R.G.S.*, 1886). Mr. Moss, now British resident of Rarotonga, paid a brief visit to Metalanim about twelve years ago, which he mentions in his book entitled 'Atolls and Islands.' An American missionary, Dr. Gulick, also took some valuable notes on the people of Ponape and their antiquities, published in Boston about 1875.

In 1885, the raising of the German flag at Yap by the cruiser *Iltis* caused much indignation at Madrid, Spain finally being confirmed in her possession by the friendly intervention of the Pope. Ever since, Spain has found the islands a troublesome acquisition. She has squandered many lives in quelling native risings, and is obliged to keep up two expensive military establishments, one at Yap in the west, the other at Ponape in the east. She gets no return from the natives in revenues or taxes, and the trading is monopolized by Germans, Americans, and Japanese, who make a very fair livelihood in dealing with the exports. These consist of copra, bêche-de-mer, vegetable ivory nuts, turtle-shell, and pearl-shell. The copra exported annually from the Carolines is calculated at 4,000,000 lbs. weight, towards which the island of Yap yields 1,800,000 lbs.

In 1895, meeting in Sydney Louis Becke, that Ulysses of Pacific waters, I determined to take his advice and visit Spanish Micronesia, in order to explore some remarkable ruins reported upon the islands of Ponape and Lele, in the Eastern Carolines. On my way out I made a brief stay at Hong-Kong, where Sir William Robinson, the Governor, was so kind as to furnish me with credentials to General Blanco at Manila, then Spanish Governor of the Philippines. He, in turn, gave me letters to the two deputy governors on Yap and Ponape, the respective seats of government in the extreme west and east of the Carolines. I left Manila in the bi-monthly mail-steamer *Venus* on December 15, touching at Yap December 22, Guam in the Ladrones on Christmas Day, and reaching Ponape on the first day of the New Year, 1896. I took with me, as photographer and general assistant, a Philippine native from the province of Pampanga, since executed by the Spaniards for joining in the late rebellion. Whilst he was with me on Ponape he took some 150 photographs in the various districts. Soon after our arrival, the powerful chief Nanapei of Ronkiti, on the south coast, gave us the island of Nalap as our first base of operations. Here we stayed three months, studying the language and customs of the natives, and taking many notes on the marine life. Subsequently we spent the month of March in the Metalanim district on the east coast, where we visited the walled islands of Nan-Matal and the sanctuaries

of Nan-Tauach and Pankatara. After leaving Nan-Matal I visited an ancient cemetery on the Metalanim border, of which I took a sketch plan.

Returning to Ascension bay in May, I made a voyage down to the south-east, visiting Mokil, Pingelap, and Strong's island—otherwise called Ualan, or Kusaie—where I sketched a plan of a remarkable Cyclopean enclosure upon the island of Lele. On my return to Ponape, I stayed five months on the island of Paniau, off the mouth of the Kiti river, watching with great interest the operations of a bêche-de-mer fishery, and making various excursions. In October I left by the mail steamer *Uranus* for Yap, where I stayed until well on in December, when I left in a sailing-vessel, which brought me up through the China seas to Hong Kong.

The area of the island of Ponape is some 340 square miles. It is surrounded by a barrier reef enclosing a lagoon about a mile and a half in breadth, and of varying depth, studded in all directions with detached reefs, and patches of live coral, the rapid growth of which on the south and south-west coasts bids fair to render navigation—except for the lightest canoes—an impossible task. On the north coast, however, the lagoon in many places is of considerable depth. In this lagoon are scattered thirty-three islets, mostly low and of coralline formation; a few of them, however, are volcanic in origin.

Chokach has a remarkable scarp or precipice, the *Paip-Alap*, 937 feet in height, on the north side of it, where the columnar form of the basalt is very clearly defined. The glen below, tradition declares, was the quarry whence the early builders gathered the material for their wonderful buildings on the east coast, straight from the workshop of Nature. Langar is the headquarters of a German trading firm.

The other islands are somewhat thinly populated, and serve merely as fishing stations. The islet of Mutakaloch, off the Metalanim coast, is remarkable for its cellular basalt formation; whilst near Kapara, which lies on the edge of the barrier reef on the south-west coast, is seen the phenomenon of a spring of fresh water welling up through the coral.

The principal harbours are five in number: (1) Ascension bay in the north, at the mouth of the Pillapenchakola river, on the west bank of which stands the little Spanish colony of Santiago, with the peaks of Kupuricha and Telemir towering some 2000 feet high in the background. To the south-west is the great scarp of Chokach, a notable landmark far out at sea. (2) Port Aru, or Oa, on the U and Metalanim border, was the scene in 1890 of a brisk action, in which the Spaniards brilliantly carried the rebel defences from the sea. (3) Metalanim harbour on the east, overlooked by Mount Takai-U, or the Sugar-loaf peak, in the neighbourhood of which are the celebrated ruins. (4) Port Mutok, called after the double-peaked basaltic islet lying inshore—the *Tenedos* of Lütke—at the mouth of the Kiti river, with the peaks of Roi, Lukoila, and Wana in the background, with a remarkable obelisk-shaped rock, called by the

native Chila-U, or the Adze-head, and by trading skippers, the "Sentry Box." (5) Ronkiti harbour, at the mouth of the river of the same name, which rises in the slopes of Mount Tolokom, the highest peak in the island, judged to be about 2860 feet high.

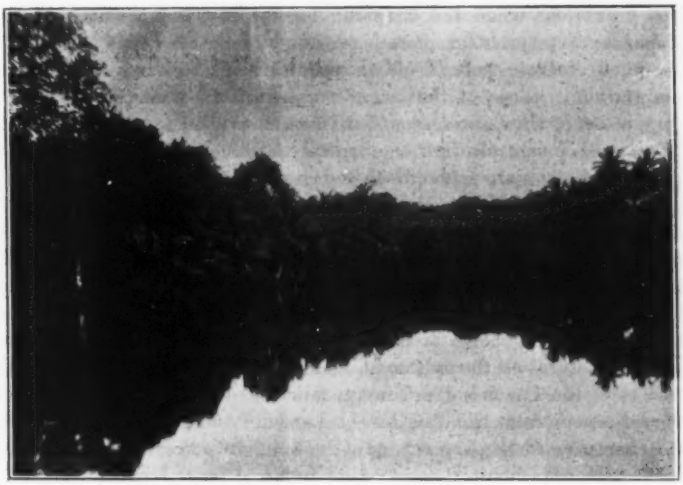
The island is divided into five districts, U, Chokach, Not, Kiti, and Metalanim; the two latter with a population of 1300 and 1500 respectively. The whole population is about 5000, living in Kanim or scattered open villages confined to the sea-coast. They are Christianized, though secretly retaining many of their old heathen practices. The north province of U is very mountainous, and some of the cliffs looking down upon the valleys show a very fine example of columnar basalt formation. The interior of the island is an almost impenetrable wilderness of densely wooded mountains and sierras, seamed with deep valleys, clefts, and ravines. The heavy annual rainfall sends down numerous torrents from the slopes of the mountains which form the central watershed. A belt of swamp, covered by thick clumps of mangroves and other salt-water brush, surrounds the island. The mangrove belt at the mouth of the rivers is traversed by a network of shallow *tau*, or waterways, barely wide enough to allow a single canoe to pass. The scenery a little way up the streams is rich in beauty. The mangroves once pierced, one passes into a region of Nipa palm, tree-ferns, and tall trees interlacing overhead, hung with all manner of ferns, orchids, and creepers, the advance-guard of the hosts of the forest sweeping down upon the rich low levels. At a little higher elevation are found two varieties of the areca or betel-nut palm, which the Ponapeans, unlike the Malays and their Yap relations to the west, do not chew. Higher up still on the mountain slopes are found some valuable timber-trees. Amongst the mountains there are some well-grassed tablelands admirably suited for the pasture of cattle. In the mountains behind Ronkiti is a lake swarming with huge eels. Other lakes doubtless exist, but unfortunately very little is known about the interior, of penetrating which the natives appear to have a superstitious dread. On the hill-slopes grows a tall forest-tree bearing a reddish-brown rough-rinded nut about the size of a cricket-ball, valuable for the varnish yielded by its kernel. The Ponapeans call it "ais." It is the *atita* of the Solomon islands (*Parinarium*).

The most productive copra districts are Kiti and Chokach, and there is a considerable trade in fruit of the vegetable ivory, or rather sago-palm—the true vegetable ivory-palm being a native of South America.

The climate is hot and moist, tempered from October to May by the trade-wind blowing fresh and clear out of the north-east. The rainy season sets in about June, lasting to the end of September. This is the time of light variable winds, with frequent calms, and occasional heavy thunderstorms and south-westerly gales. According to Dr. Gulick's observations, the highest temperature marked in a period of three years

was 31·7° Cent. (*i.e.* about 89° Fahr.), and the lowest 21° (about 70° Fahr.). The average temperature is 28·3° Cent. (= about 83° Fahr.). The annual rainfall is somewhat heavy. In the year 1890, observations taken on the *Maria Molina* hulk in Ascension bay gave 230 days in the year on which rain fell, and a total rainfall of some 36 inches.

The Ponapeans, like the rest of their Caroline neighbours, much resemble the Malays of the Philippines and the Sulu archipelago, the Dyaks of Borneo, and the wild hill-tribes of the island of Formosa. It is, however, natural, considering the various streams of population that have swept over the wide Caroline area, that the people of this region should exhibit quite a variety of racial types. Upon Ponape



SCENERY NEAR THE MOUTH OF THE RONKITI RIVER, KITI DISTRICT, SOUTH-WEST COAST OF PONAPE.

one finds a negrito type amongst the people on the bank of the Palang river, on the south-west coast. Amongst all the tribes of the island, I have seen individuals who, if a trifle lighter in colour, might pass for Samoans or Tahitians. The Polynesian element, however, is by no means the most powerful factor in the combination here, though in the Central Carolines, Ruk, and the Mortlocks it appears much more clearly. It is the sturdy Papuan or Melanesian element, derived from the lands of the south, which we find most strongly marked in Ponape. This influence is seen at work in the very language, wherein we see numerous unmistakable Polynesian words struggling for existence with all their vowel softness ruthlessly squeezed out and twisted into harsh and crabbed vocables. Here the rough and hairy

Esau has certainly ousted his smooth-voiced brother and rival. The soft Polynesian phonesis has suffered as badly in Ponape as our numerous adopted Latin and Norman-French words in English. There is evidence of the admixture of an intrusive Mongolian element from the north-west, though not in the same dominant proportion. This is doubtless due to the visits, accidental or otherwise, of trading-junks and pirate vessels from Japan or Southern China. In proof of former Mongolian activity in these seas, witness the attack on Manilla in 1600 by Chinese and Japanese pirates, and the expulsion of the Dutch from Formosa by Koxinga. The port of Nagasaki is mentioned in Japanese tradition as the place from which trading expeditions went to the Nan-Yo, or Isles of the South, as early as 800 A.D., continuing up to the year 1580, when the Emperor To Kogun Sama, wishing to keep Japanese enterprise at home, forbade them by edict. The latest recorded of these remarkable race-eddies and counter-currents is the emigration *en masse* of the larger portion of the Chamorros, or native population of the Ladrones or Mariannes, through the islands of Uluthi, Uleai, and Lamotrek, into the central Caroline area. Traces of their peculiar dialect are found to this day as far as the Mortlocks.* This took place towards the end of the sixteenth century, following the Spanish conquest of the Marianne group. The Ponapean traditions of their own origin are tolerably explicit. They mention first the Chokalai, or dwarf aborigines; then the Kona, or giants, otherwise called *Ani-aramach*, God-men or heroes, two of which, Olosipa and Olosopa, are mentioned as the builders of the walled islets and great stone structures on the east coast. Thirdly come the *Li-ot*, or cannibals, said to be the Tip-en-uai, or foreign folk, who came up in a great fleet of war-canoes from the Pali-Air, or Lands of the South. These seized the sanctuary of Nan-Tauach, slew the builders, and turned the civilized rule of the old Chau-te-Leur dynasty into a chaos of ferocious misrule.

As a rule the Caroline islander is fairly honest. Once lay his suspicions to rest and win his confidence, and he will prove himself a faithful friend and an excellent host, courteous and just in all his dealings, as I have very good cause to know. On the other hand, when dealing with his enemies, he calls into play a talent for intrigue, lying, and chicanery that would delight a Machiavel. In his private life he is unselfish, frugal, and economical—a man of careful small habits. Like all folk of Melanesian admixture, he is liable to fits of dangerous sullenness when he considers himself slighted in any way. He is inclined to be

* Cf. Mariannes, *galago* / Mortlocks, *kolak* } a dog.
Mariannes, *magagu* / Mortlocks, *mangaku* } clothing.
Mariannes, *magas, makau* / Mortlocks, *makal* } a high chief.

revengeful, and will bide his time patiently until his opportunity comes. Yet he is not implacable, and counts reconciliation a noble and princely thing. There is a form of etiquette to be observed on these occasions—a present (*katom*) is made, an apology offered, a piece of sugar-cane accepted by the aggrieved party, honour is satisfied, and the matter ends. The Ponapean is a stout warrior, a hardy and skilful navigator, fisherman, carpenter, and boat-builder, somewhat of an astronomer and herbalist, but a very second-class planter and gardener.

Their manner of life is simple and hardy. They go about in all weathers, rain or sunshine. The men's dress consists of a long thick native kilt or girdle of split coconut filaments (*kol*), the upper part of the body generally bare. The women used to wear a sort of deep petticoat (*likau*), woven of the fibres of a tree called *Nin*. Nowadays, greatly to the peril of their health, they have adopted European clothes. These they keep on their backs, whether wet or dry, which induces all manner of pulmonary ailments.

Their food consists generally of fish or shellfish, and a vegetable diet of yams, bananas, taro, and bread-fruit. The forests yield pigeons and some smaller birds very good for food. On the occasion of a feast, pigs and fowls are added to the bill of fare. The flesh of the dog (*kiti*) is highly relished, especially on the east coast. Crabs, crayfish, and fresh-water prawns, are also in request. The turtle is set apart for the chiefs alone. Eels, whether of the salt or fresh-water, they will not eat, and hold them in the greatest horror.

The special department of the women is the making of mats and shutters of reed-grass, the plaiting of baskets, and binding the leaves of the sago-palm into bundles for thatch. They make the leaf-girdles of the men, and compound the coconut-oil and fish-oil and the cosmetic of turmeric, without which no Ponapean dandy's toilet is complete. They fetch water in calabashes, light the fires, build the stone ovens, prepare the food, and perform all the household duties. When required, they cheerfully assist the men in their outdoor labours, and in time of war accompany their husbands and relations fearlessly into the battle.

The formality of marriage between young people is singular. The girl is brought into the house, and sits down whilst her future mother-in-law rubs coconut-oil vigorously into her back and shoulders. This is called *keieti*, or anointing. A garland of flowers is placed on her head, and the ceremony is concluded by a feast. The marriage bond may be severed at any time at the consent of either party. The Ponapeans for the most part content themselves with a single wife, polygamy being the privilege only of the wealthy and powerful chiefs.

Adoption of children is universal, and forms a complicated chain of relationships. Descent is traced through the mother—a custom tolerably common amongst the Oceanic races in general. Members of the same

tipu, or clan, cannot marry; a wife must be taken from one of the other divisions. The suitor serves for his wife in the house of his father-in-law elect as Jacob did with Laban, and frequently has his pains for nothing. Men and women alike practise tattooing (*inting*) on the arms and lower limbs. Unlike the Marquesan islanders, they do not tattoo their faces. The women use a design taken from the interlacing of coconut fronds in their leaf baskets. Other designs are circles and eight-pointed stars and crosses. The young men, to show their contempt for pain, are in the habit of inflicting knife-gashes and burning deep scars on their breasts and arms.

They bury their dead with great ceremony and solemn funeral operations. They are most unwilling to repeat the name of a dead ancestor—a very Melanesian trait. Consequently we find in Ponape no elaborate family genealogies, like the ancient and carefully preserved oral records of the Marquesans and Maoris and the kindred Polynesian races.

Other interesting usages I pass over in brief: The *Charaui*, or Tabu, a series of solemn prohibitions defending life and property and enjoining the due performance of numerous religious observances; the *Chapu*, or definition of rights, ownership, and privileges of a chief; the elaborate ceremonies at their kava-drinking festivals held in their great *Nach*, or council lodges; their singular divisions into *Tai*, or brotherhoods, which form such a strong factor in their political union; the *Lekelek*, a terrible ethnic mutilation inflicted on their youth on reaching puberty, an ordeal which all must undergo; the *Ichipal*, or exchange of wives amongst friends, cousins, and brothers.

Their method of making war was as odd as the rest. Solemn notice was given, naming the day and appointing the place of battle. The beaten party were not pursued far, nor pressed to extermination. Prisoners were frequently spared, but sometimes were solemnly offered up in sacrifice to the tribal war-god. Litt'e damage was done to the plantations and fruit-bearing trees under this system—remarkably mild for a people who hold human life so cheap.

The tribes of U and Metalanim are governed by their Ichipau, or titular kings; those of Kiti by their nanamareki, or rajah; and those of Chokach by a wachai, or prince. After the chief ruler come twelve orders of chiefs, Chaulik being the smallest title of all, and after these the *Aramach-mal*, or common folk, and the *Litu*, or slave-class. Counted equal to the nobles were the two religious bodies, the *Chaumaro*, or high priests, and the *Laiap*, or priests of the second order. The head of the Chaumaro in each tribe was called *Na Uaim* (*Nan-Laim*). These were of great weight and importance in the land, and united the functions of doctor, magician, rain-maker, and diviner. Theirs was the knowledge of medicinal herbs and poisons, the gift of prophecy and of second sight, the interpretation of dreams and omens, and the dreaded power

of *Ka-ria*, or imprecation of curses. Upon them devolved the ordering of court ceremonies and public festivals, and the seasonable invocation of the gods of rain and harvest, the staving off of famine and all calamities public and private, the maintenance of the Charaui, or Tabu. Theirs were the principal seats upon the Lempantam, or high stone platform in the Nach, or council lodge; theirs, next to the king's, the best portion of cooked food and Kara upon the days of solemn festival. Throughout all the tribes great respect was paid to the chiefs. As in Malaysia and Polynesia, there were many special words used in addressing a chief, and again there was another set form of words for addressing the king, who was looked up to with great awe, and only addressed in the plural of majesty as *They*. The chiefs mingle amongst their tribesmen with great familiarity and affability. They all hold together loyally—offend one, and all are eager to take up his quarrel. If the chief be a kindly hospitable man, his people will follow his example. If he be a rogue and a churl, his people will act as rogues and churls too. The people seem to have little independence of judgment, and love to follow the lead of their chiefs in all things, right or wrong.

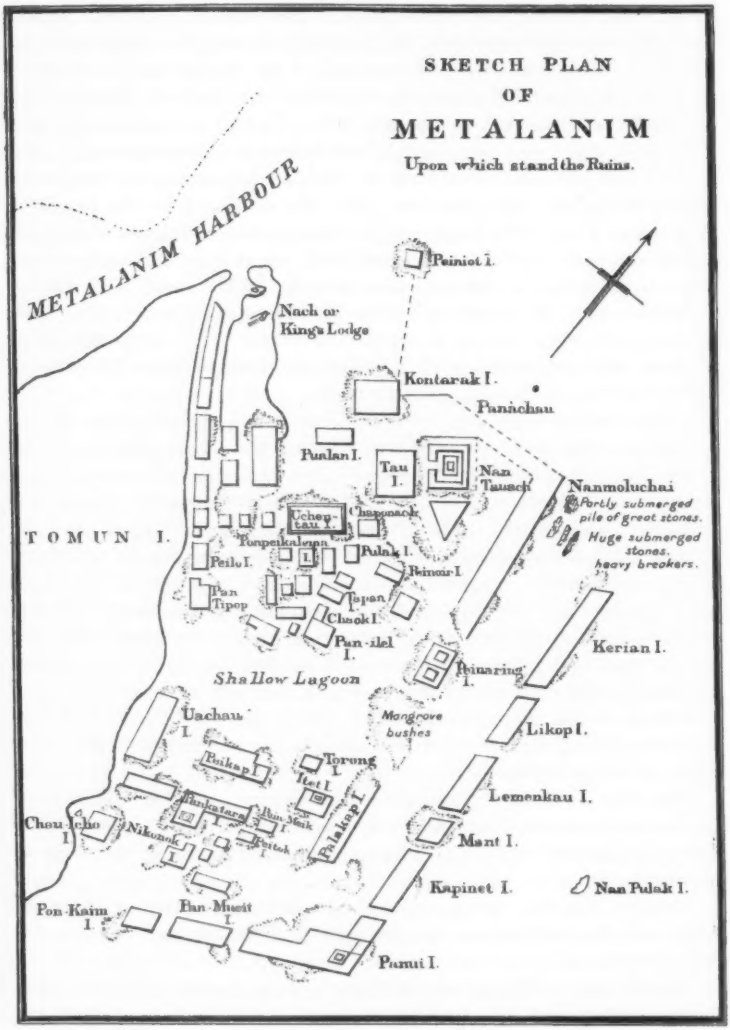
The worship of the *Ani*, or deified ancestors, coupled with a sort of totemism, is the backbone of the Ponapean faith. Every village, every valley, hill, or stream, has its *genius loci*, every family its household god, every clan its presiding spirit, every tribe its tutelary deity. Thunder, lightning, rain, storm, wind, fishing, planting, war, festival, harvest, famine, birth, disease, death,—all these events and phenomena have their supernatural patron or master-spirit. The gloomy fancy of the Ponapean peoples the swamp, the reef, the mountain, and the hanging woods of the inland wilderness with hosts of spirits, some beneficent, the greater part malignant. All these *Ani* are honoured under the guise of some special bird, fish, or tree in which they are supposed to reside, and with which they are identified. Thus the chestnut tree is the medium of the god of thunder, the blue starfish of the god of rain, the shark of the god of war, etc.

In their mythology they have a submarine paradise. They also have a subterranean Tartarus of mire, cold, and darkness, guarded by two grim female forms, one holding a glittering sword, the other a blazing torch.

I will now give a description of our visits to Metalanim, on the east coast, and the result of our explorations amongst the famous ruins of Nan-Matal.

On the map of Ponape you will see a dense group of islets in the lagoon between reef and shore on the east coast, a little way down to the south of Metalanim harbour, and close under the islet of Tomun. They are between fifty and sixty in number. These numerous rectangular islets are mainly artificial in formation, built up out of the shallow waters of the lagoon. We found them enveloped in mangrove clumps,

and shrouded in a dense mass of jungle and creeper. Two of them, Nan-Tauach and Pankatara, are encased in walls built of columnar basalt



shafts and prisms; others, like Uchentau and Itet, solidly faced with the same primitive material. A network of shallow canals intersected this island labyrinth, for the most part not holding more water than is

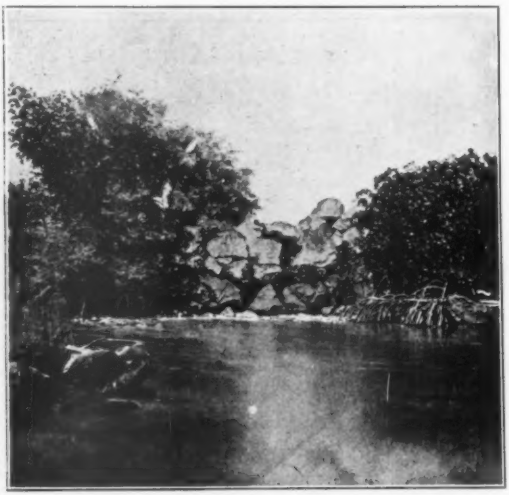
required to float a canoe. The natives call the place Nan-Matal, or the place of the Matal or waterways. The tribal district off the coast of which this remarkable group of islets lies is called Metalanim, or "waterways between the houses." A massive breakwater runs along the edge of the deep sea, shutting in this picturesque mass of woods and waters. Against this rocky outer barrier break heavy rollers. Even in calm weather the swell makes landing here very dangerous, as we found out to our cost when we attempted to land at Nan-Moluchai, close to which is the inner harbour, of which two views of Kubary's give an excellent idea. Out to sea lie the islands of Na and Nakap, where there are scattered remains of another ancient sea-wall. From

THE INNER HARBOUR AT NAN-MOLUCHAI.
(*From a photograph of Dr. J. S. Kubary's.*)

Nakap one can see the massive walls of the breakwater stretching down southward for 3 miles, the masonry showing out here and there through the dense tangle of shrubs and mangroves which crown and encircle the islets forming the great outer breakwater.

The area occupied by the islets of Nan-Matal is about 9 square miles. For the most part they are deserted, and altogether there are not above twenty people living on the three or four inhabited ones. Some of them are planted with coconuts and bread-fruit, and are visited occasionally by fishing-parties. The King's island of Tomun and the shores of Metalanim harbour are fairly thickly populated, but the folk as a rule give Nan-Matal a pretty wide berth. They say the place is haunted,

and on certain of the islets, such as Pan-Katara and Pei-Kap, nothing will induce them to set foot. All the enormous quantity of basalt which the ancient builders used must have been brought in canoes or rafted down the coast, a distance of 20 to 30 miles. These pillars and blocks were carried down to the sea from the dales below the precipices of U and the great perpendicular scarp of Chokach, where the columnar basalt formation is very strikingly marked. Here were grand natural quarries, whence the builders might select all the shafts and pillars required, lying around ready shaped to their hand. We can still follow the course of the canoes or rafts which brought these great masses down. All around Ponape the bottom of the lagoon is strewn with blocks of



THE BREAKWATER AT NAN-MOLUCHAI: ENTRANCE TO THE INNER HARBOUR.

(*From a photograph of Dr. J. S. Kubary's.*)

basalt, which may have fallen from the canoes on their way. The natives account for their presence by saying that they are the bits of basalt used as sinkers for their nets, which grow large when they fall off and remain long in the water.

We made three visits to the ruins, choosing the island of Uchentau for our camping-ground, where we remained in all about ten days.

The first of the islets we visited from Uchentau was Nan-Tauach, the most remarkable of all the Metalanim ruins. The water-front is faced with a solid terrace of massive stonework, about 6 feet wide, standing over 6 feet above the shallow waterway. Above is a striking example of immensely solid Cyclopean masonry. A great wall, between 20 and 30 feet high, and about 10 feet in thickness, formed of basaltic

prisms laid alternately lengthwise and crosswise, encloses an oblong space, which can be entered only by the great gateway in the middle of the west face, and by a small portal in the north-west corner. The

PRINCIPAL ENTRANCE ON THE WEST SIDE OF THE SANCTUARY OF NAN-TAUACH, THE MOST REMARKABLE OF THE WALLED ISLETS OF NAN-MATAL.

right side of the gateway is overshadowed and all but hidden from view by the dense leafage of a huge Ikoik tree. This we had not the heart to destroy, a wonder of deep green heart-shaped leaves, thickly

CENTRAL AND PRINCIPAL VAULT OR TREASURE-CHAMBER, CALLED THE TOMB OF KING CHAU-TE-LEUR, OR CHAU-TE-REUL.

studded with tassels of scarlet trumpet-shaped flowers. In olden times the walls must have been considerably greater in height, but much of the masonry has now fallen into lamentable ruin. A series of huge rude steps brings us into a spacious courtyard, strewn with fragments of fallen pillars. This encircles a second terraced enclosure

topped by a remarkable projecting frieze or cornice of stonework. The outer enclosures we ascertained to be 185 by 115 feet, the wall varying in height from 20 to nearly 40 feet; the inner, which forms a second conforming parallelogram, measuring 85 by 75 feet. Height of the wall, 15 to 18 feet; average thickness, 8 feet. Another rude flight of steps leads up to the great central vault or treasure chamber, said to be the grave of an ancient monarch, who bore the dynastic title of Chau-te-Leur. It was difficult to gain much information about the old traditions at first. The natives certainly know something about the history of these ruins, but do not care to talk of them to strangers. This reticence I had to patiently overcome little by little, and consequently bit by bit a tolerably explicit little chapter of history was built up.

It appears that in olden days Ponape was much more populous than at present. All the tribes in the days of the builders were united under a powerful line of kings. The last of this dynasty met his death facing a great invasion of barbarians from Pati-Air, the barren lands of the south, probably some portion of New Guinea, the New Hebrides, or some neighbouring portion of Melanesian area. They arrived in a great fleet of canoes under the command of a fierce and terrible warrior, Icho-Kalakal. The savage invaders poured in upon the peaceful settlers, and blotted out the ancient civilization, after a great battle, in which numbers were slain on both sides. Part of the walls were thrown down, and the defenders either slain in battle or offered up in solemn sacrifice to the war-gods of their conquerors. King Chau-te-Leur himself, in his flight, perished in the waters of the Chapalap river, at the head of Metalanim harbour. The Ani changed him into a blue river-fish, which the folk of Metalanim to this day will not eat.

Now, the underground chamber or vault which bears King Chau-te-Leur's name lies right in the centre of the inner precinct, facing the great gateway. It is about 8 feet in depth, roofed in with six enormous slabs of basalt. The flooring was paved by some heavy basalt blocks, which we had great trouble in lifting away. Below this was a layer of soft vegetable mould, thickly matted with a tough root-growth that made excavation somewhat troublesome. The side nearest the entrance threatens soon to fall into ruins, and we had to pursue our digging operations very cautiously in this corner, for fear of being crushed by the collapsing of these mighty masses of masonry.

There are three other tombs or vaults besides the large central one, situated on the south-west, east, and north-west sides respectively. They are smaller in size, and gave up rather scanty results to our excavations. The one on the east side is very narrow, and some 12 feet in depth. Paul, the king of the Metalanim tribe, sometimes uses them as dungeons to confine those who offend him—a punishment greatly dreaded by the natives, in their child-like horror of the dark, and of the viewless spirit forms with which their fancy peoples these lonesome places.

"The eyes of the spirits are watching everything you do," said Keroun, one of my workmen, as he tendered me his resignation. "I *know* they are angry; they will not injure you because you are a white man, but they will punish us. I am very much afraid; I cannot sleep at night, and I would like to go home."

Standing on the south-west angle, where the wall is nearly 40 feet in height, one looks down upon a green abyss of nodding woodland,

SOUTH-WEST ANGLE OF OUTER WALL OF NAN-TAUACH; HIGHEST POINT.

with never a glimpse of the network of canals rippling below. The north-east angle is occupied by an enormous banyan tree towering full 50 feet above the masonry in which it stands firm-rooted, thrusting its bunches of thread-like root-fibre into every crevice. These as they swell exercise a constant and gradually increasing force, wrenching the blocks out of place. When a high wind blows the structure is racked through and through in every joint and keystone. Sooner or later, if nothing is done to remove the tree, this side of the wall will settle down into ruins. A tangle of weeds, grasses, India shrubs, and creepers thickly carpets the precinct. Clearing it gave us no end of work.

Beyond the two small cross-walls on the inner side of the great outer wall on the south-west side is a remarkable slab, inclining to a crescent shape, balanced on two solid shafts projecting out from the masonry. This, when tapped, gives a clear ringing sound, and was probably used for an alarum or for a sort of bell in sacred ceremonies. The north-west angle, as we come out upon the canal boundary on the west side, gives a happy impression of the style of architecture, the

NORTH-WEST ANGLE OF OUTER WALL OF NAN-TAUACH.

two walls at their junction running up high and bluff like the bows of a Japanese junk. Beneath, the terrace fronting the waterway is overgrown by a belt of young coco-palms of recent growth.

News of our excavations, and of the havoc we were making in the jungle in our clearing operations, finally reached the ears of King Paul, who at once put a stop to our work. Most unfortunately, his superstitious terrors were confirmed by a very severe epidemic of influenza that broke out in the tribe shortly after our departure, and carried off many of the Metalanim people.

The result of our excavations in the central vault was distinctly encouraging, and it is a great pity more time could not have been spent at it. To thoroughly explore and clear the labyrinth of this Micronesian Venice and to make thorough excavations would take several months' hard work. It is very difficult to get the natives to work here, owing to their dread of the vengeance of the ancestral spirits and heroes hovering around these holy places, ready to let loose some terrible judgment upon the head of rash intruders. Another great drawback to exploration likely to continue during the reign of King Paul is a deep-seated hostility to the white man felt by many of the Metalanim tribesmen. When a more enlightened chief succeeds him, future explorers will have a better chance.

The list of our finds included eighty shanks of fish-hooks of pearl-shell in a more or less perfect condition, possibly broken on purpose by the clansmen on the burial of their renowned chief. Close by Metalanim harbour is a district called Matup, still renowned for its manufacture of shell bracelets. We found five of these carved shell rings of elegant design, and twenty or thirty plain ones. Most of them were far too small to go round the wrist or arm, and probably were strung into necklaces with the edges overlapping, like the neck ornaments of the Melanesian area.

We found a great number of pink round shells and pendants of rectangular shape, which, when strung in rows upon a framework of fine cinnet thread and banana fibre, formed the *Tor*, or chief's belts, which in Ponape to this day are so valuable an heirloom. Some of the beads were nearly as large as a halfpenny, most about the size of a shilling; the smallest were very minute in design, only about a line in diameter. Our great prizes, however, were ten or twelve ancient axes, three of them about a yard in length, rubbed down from the central shaft of the *Tridacna gigas*, or giant clam. Some of the smaller ones were of fine workmanship, white and strong as polished marble, with keen cutting edges. Others, again, had suffered greatly from erosion from their burial through untold generations. I have since seen two shell axes very similar in design, but much smaller, in the collection of the Rev. R. H. Codrington, who obtained them from the Banks islands.

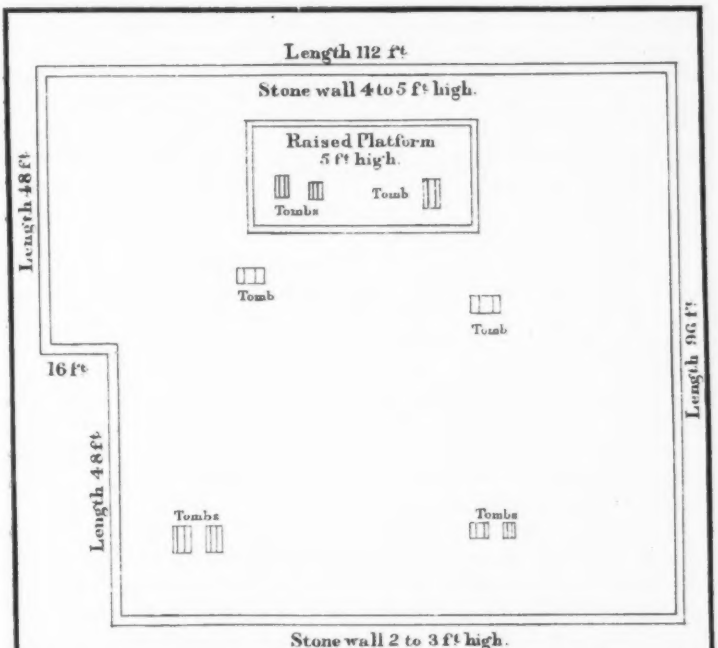
The names of some of these embanked islands are interesting. *Nan-Tauach* means the "Place of Loftiness" or the "High Walls." *Nan-Moluchai* may be taken to mean "the Place of Cinder-heaps," left from the cooking fires of the host of workmen who assisted the demigods Olo chipa and Olo-chopa in the construction of the mighty breakwater and walled islets which occupy the space within. *Pei-Kap* means the "New Pavement." On the east side of Pei-Kap is the turtle-stone of Icho-Kalakal, upon which men say the captives of war were sacrificed to Icho-Lampoi, the god of war. *Lamenkau* means "Deep blue water off

the edge"—a highly appropriate name for its station on the breakwater. There is a Lamenkau also in the Banks islands. *Pan-Ilel* means the place where you have to steer, so called from the intricate mass of shallows around it, choked up with water-weed, man-groves, and salt-water brush. Near Pan-Ilel a huge block of basalt lies under the masonry at the canal side, called the shield of Chau-te-Leur.

The name of the haunted island of Pan-Katara means the Place of Proclamation or the Sending forth of Messengers. This precinct, tradition declares, was anciently the seat of government, where the king and nobles held solemn session and festival. The isle is greatly dreaded by the natives, who say that the curse of leprosy will smite any one who sets foot in the place. The height of the wall which surrounds this island is 27 feet. The solitary inhabitant is a white goat, who, tired of the society of ghosts and shadows, came down to meet us, bleating his welcome at the sight of honest flesh and blood.

After leaving Lot we went down to visit Joe Kehoe at Nantamarui, close to the Kiti border, where we stayed several days. On hearing from our kind old host of some curious ruins on a hillside in the back country, I determined to explore them. Accordingly one fine morning Joe Kehoe, his eldest son Louis, and myself are trudging up the hill-ridge behind Nantamarui over a rough, steep, and intricate trail—I will not call it pathway—thickly carpeted with convolvulus, which treacherously hid from our view the numerous slippery boulders and fragments of shivered basalt. By-and-by the labyrinth became worse than ever, and for several hundred yards we had to fight our way on, hewing right and left with our 18-inch knives, climbing over fallen trunks of great forest trees, and ducking under low natural archways of hibiscus. As by degrees we worked our way nearer to the region of tall forest trees, the underwood became less dense. Finally, passing one of the buttressed kings of the forest, we suddenly came upon a low breastwork of stones enclosing the object of our search, which turned out to be a cemetery in the shape of an irregular or broken parallelogram, as can be seen from the sketch-plan. Six graves were found in the lower enclosure, and three on a platform raised five feet above the level of the ground. All were little vaults not exceeding 4 or 4½ feet in length within—roofed in with massive slabs of basalt, the graves of the fairy folk, little woodland elves, answering to our own pucks and pixies. Ethnologists would style them dwarf negritos, like the Aetas of the Philippines and the Jakou of New Guinea. These Chokalai, according to Ponapean tradition, were the little dwarfish folk who dwelt in the land before the coming of "Kona" and the "Liot," the giants and the cannibals. The two latter terms, as I have already said, probably represent respectively the Malayo Polynesian settlers and the savage Melanesians from the south. The speech of the dwarfs, it is said, was a chattering and a gibber as that of bats; they were dark of skin, and

flat-nosed. They are believed still to haunt the dark recesses of the forest, and are very malignant and revengeful. I was told that one man who came to this haunted dell to plant kava, was caught up and spirited away by the revengeful goblins, and his lifeless body was found many days afterwards, stretched upon a great flat rock by the seashore off Nantiati point. A curious fact concerning this primitive race was supplied me by the Au of Marau shortly before leaving Ponape. The people at the mouth of the Palang river, near the Chokach and Kiti



GRAVES OF THE "LITTLE PEOPLE"

border, are said to have been descended from the *Chokalai*, who, it seems, were not everywhere exterminated by the Malayo Polynesian conquerors. The Au's description runs thus: "In the speech of the Palang folk is a most foolish undercurrent of chatter; they are shorter in stature and their skins darker than their neighbours'; their noses are flat, and they are known throughout the tribes as the *Paikop-faces*. Now, the Paikop is the most ill-favoured of fishes, with wide goggle-eyes and a face as flat as a dish." Unluckily, I had no opportunity of visiting the Palang folk, though they are said to be thieving and treacherous. There seems

no reason why the tale of the Au should not be true, and that we have here, overlapped and all but exterminated, the survivors of the Negrito race who made these curious little graves.

After clearing away the luxuriant undergrowth, we cautiously removed the basalt slabs at the top of each little vault, and found in the red soil within an abundant deposit of blue mould, promising good results. In the first few minutes a very minute shell adze-head was turned up, and a stone knife. No other results rewarded our efforts, save a few pieces of mouldering bones. All the rest, with the great lapse of time in a damp and hot climate, has literally melted away like sugar. Not one single red or white shell-bead was brought to light in any of the seven graves opened, although in the central vault of Nan-Tauach we had found a very large number. The graves on the upper platform gave no better return, yielding only a few pieces of mouldering and unsubstantial bone to our most careful search, whereupon Louis shrewdly remarked that the Chokalai must have been either very stupid people who wouldn't work, or very poor and barbarous wretches, not to have any treasures to bury.

I must pass over my visit to Mokil and Pingelap, and tell how I arrived at Kusaie or Strong's island, from whence I visited the island of Lele. During my brief stay there, from the 10th to the 15th of May, I was the guest of Teleusar the Tokosá, or king of the island, who in his youth had made many voyages in whaling ships, and had acquired a fair knowledge of the English language. In his company I visited the Pot-Falat, or "Lofty walls," as the natives call the remains of cyclopean masonry, for which their island is famous. The ruins of Lele are not so elaborately constructed as those of Metalanim, but they have a massive grandeur of their own.

To reach the Pot-Falat we had to skirt some cyclopean walls, built of enormous basaltic blocks, rudely fitted together, and evidently of great antiquity, but now falling into ruins. Then, turning inland, about 300 yards along a muddy lane, shut in by fern-covered walls some 5 feet high, we caught sight of the great outer wall of the principal enclosure. The masonry is composed of rude basalt blocks and prisms, many of them enormous in bulk, but clumsy in disposal. Looking at their solid outlines, seamed and furrowed by the rain and sun of untold generations, one cannot help marvelling at the ingenuity and skill displayed by these primitive engineers in lifting, moving, and setting down such huge and unwieldy masses of stonework.

The sides of the enclosure of the Pot-Falat measure 194 feet by 110 feet. On the east side the wall has been much destroyed, and is now a rough mass of broken basalt varying from 8 to 15 feet in height, overgrown by a wild tangle of hibiscus and other brushwood, ferns, and creepers. At the south-east angle the wall rises to a height of 30 feet, and the masonry is very massive, one of the blocks measuring 10 feet by

8 feet and 2 feet 6 inches, and embedded one above the other in the foot of the wall are three roundish masses of basalt, the lowest measuring 6 feet by 4 feet by 3 feet. At the south-west angle the stonework is 20 feet high. In the west wall are two openings—the first 7 feet and the second 15 feet wide. There are also two openings on the north side. The walls were probably about 10 feet in width; but, owing to their ruined condition, it is not now easy to determine if they were originally of the same breadth throughout.

Outside the north and east walls there runs a shallow canal, bordered by a low stone wall. Rough stone barriers have been recently built across it by the natives to keep out the high tides; but it seems probable that this canal, and the many others, of which there are abundant remains on the island, were constructed for the purpose of rafting up the huge blocks and pillars from the beach, whither they had been brought from South harbour, where nature has indulged her spoilt children by providing the massive shafts ready cast in her furnaces underground.

There is little of interest to be seen in the interior of the enclosure. A ruined wall divides the space into two courtyards, which are overgrown with coco-palms, banyans, and jack fruit, and a tangle of creepers and underwood, conspicuous amongst which stand out the red spikes of the Ixora.

Much to my regret, there was no time to make any excavations which might have brought to light, as in the ruins of Metalanim, some interesting specimens of native weapons, beads, and shell bracelets. Any future visitor, however, who is ambitious of making excavations inside the Pot-Falat need have no anxiety that King Teleusar will behave as badly as his brother monarch of Ponape, the churlish King Paul. Doubtless, a thorough exploration of the little island lasting several weeks would reveal many curious relics of the past.

The interior of the island is somewhat hilly, and very thickly overgrown with brushwood and forest. Most of the south-eastern and south-western portion of Lele is a tract of low land patiently and laboriously reclaimed in olden time from the sea. A network of canals, very much out of repair, intersects this reclaimed land, many of them partially filled or banked up by the natives in modern times to keep the tides from turning their taro patches and cleared lands into a salt swamp. The remains of immensely solid walls in the neighbourhood of the king's house and along the beach, are no doubt, like the Pot-Falat, relics of an elaborate system of fortification, the product of large numbers of native workmen toiling under the orders of an intelligent minority belonging to a superior race who had a practical knowledge of engineering. As said before, the natives have a dim tradition of foreigners coming in strange vessels out of the north, who settled on Lele and put the chiefs of Ualan —the main island—across the bay to tribute.

The natives do not appear to consider that any special sanctity or awe attaches to these structures. Though possibly the work of a kindred race, the ruins of Lele are far rougher and ruder in design than those of the east coast of Ponape. If so, it may be contended that on Ponape, a much larger island, there were more workmen and better material, which consequently gave a superior result.

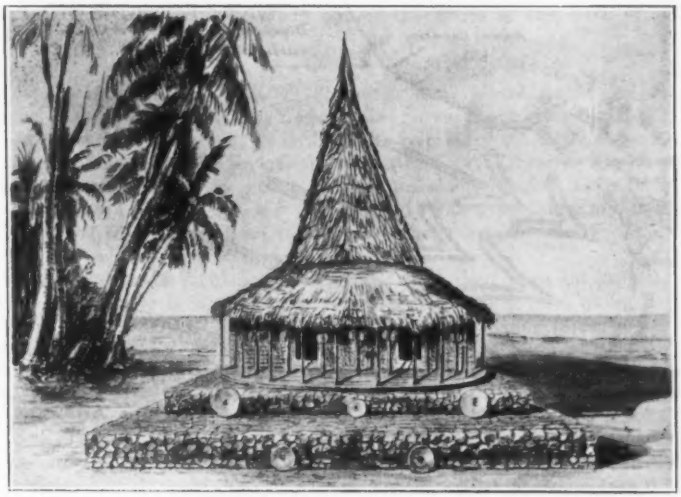
Like the Ponapeans, the people of Lele used extensively axes and adzes (*tola*) of excellent workmanship, laboriously ground and polished down from the great central piece of the *Tridacna gigas*, or Popol shell. The specimens obtained from Li-kiak-sa, the venerable native teacher of Lele, are excellently white, and smooth as polished marble, with fine cutting edges. In length they measure from 6 to 9 or 10 inches, by 2 or 2½ inches in breadth. From the pendanus leaf the natives make hats, ornamental baskets of pretty design, and light delicate sleeping-mats of fine texture. But the most interesting industry of all is their weaving of fine belts and ribbons from the soft and delicate fibre of the banana. The Banks islanders have a similar machine, and produce a similar fabric with a chevron ornamentation. The people of Bencolen, in Sumatra, use the same kind of loom, which they called *Pisa*. In manufacturing it they use a loom or primitive weaving machine (*puas*), very similar in model to that seen in some of the villages in the interior of Japan, where the restive demon of machinery has not yet wholly ousted hand-manufactures. The patterns are quaint and graceful, and the grouping of the tints carefully considered and worked out. Harsh, crude, conflicting colours are strictly set aside. A rich blue tint is obtained from the juice of the young banana suckers, the wild turmeric root supplies the shades of yellow, black tints are obtained from burnt nuts of the Aleurites, and a rich reddish-brown is prepared from the scraped and pounded bark of the mangrove.

I will now ask you to follow me to Yap, where I arrived in October, 1896. The Yap group consists of one main island and a number of smaller isles. The main island is composed of volcanic rock and of coral limestone. Towards the north it is nearly cut in two at the isthmus of Girigir. In the north and central part of the island there is a range of hills of slight elevation which does not exceed 1000 feet, whose slopes distribute the rainwater to the lowlying districts. When any considerable time passes without rain, the water runs short. The population amounts to some 8000. The folk apparently belong to the Malay race, with a slight mixture of Polynesian. They are not particularly cordial to strangers, but when once accustomed to their presence they are inclined to be hospitable. They are revengeful when they conceive that their honour is insulted, and they often fail to keep their word. On the whole they may be said to be peaceful and apathetic. They are fond of fishing, and their robustness of body and docile nature make them well adapted for all sorts of labour, though in

general they are lazy. Socially they are divided into four classes—nobles, magicians, rich men, and slaves. Their houses are solidly built of bread-fruit and callophyllum wood, artistic in form, thatched with nipa palm and pandanus leaf. The walls are of light canes bound in rows with a cording of cinnet or coconut fibre.

Yap does not produce many timber-trees. The island is surrounded by a belt of coconut palms about half a mile in thickness. No cereal is under cultivation. Maize would probably yield well, but I never saw any, and the Spanish told me that they had not tried it.

During the south-west monsoon, which begins in June, the days are calm, and there are heavy dews and much moisture, and from the



FE-BAI OR CLUB-HOUSE AT LAI, SOUTH YAP, SHOWING THE CALCITE OR LIMESTONE DISCS CALLED FE, THE NATIVE CURRENCY.

middle of July to the beginning of August there are heavy rains. During the north-east monsoon the weather is dry and there is little dew. Typhoons are not uncommon between August and December. The temperature varies from about 74° to 80° Fahr.

Before describing the architecture of the club-houses and the ancient tombs, I must call attention to the peculiar coinage or medium of exchange in Yap. First and foremost comes the stone money, which consists of quartzen wheels, varying from 6 to 8 inches to 12 feet in diameter, which form a most unwieldy medium of exchange. A man who had extensive business debts to meet or cash payments to make would need some ten yoke of bullocks and a waggon to transport his

specie. Generally speaking, however, these stones are more for show and ornament than for use. The village club-houses are called *Fe-bai*, or stone money houses, from the wheels of stone which rest against their walls. In any of the settlements these great discs or wheels may be seen leant up against the walls or terraces of the houses of the *Madangadang*, or plutocrat class, which here, as elsewhere, enjoys considerable distinction in the national councils.

A perfect pair of large shells, the valves of the pearl oyster, are also

Etch or stone fish-weirs above the Malaf ford between the islands of Map and Ramung-North Yap.
Depth of water amongst the fish-pens varies from 4 to 9 feet.
Ancient Cemetery
Tan-ni-Eruach
RAMUNG I.
Capt. Brugmann's house
Ford across the Straits some 300yds. broad.
Village of Malaf
MAP ISLAND

highly valued and used as money. The natives call them *Yar-ni-Balao*, *i.e.* Pelew island shells; the early Yap navigators used to make extensive forays on the pearl-shell beds of their long-suffering neighbours of the Pelew group, and were often forced to defend their ill-gotten treasure in many obstinate battles by land and sea. The smaller specimen of pearl-shell threaded upon strings of hibiscus fibre or cinnet, about twenty on a line, used to be employed as small change. In these days, however, bags of copra or dried coconut kernel are employed as

a medium of exchange. It may be observed that in the northern islands of Map and Ramung, and the wilder parts of the main island, the money of the white man, whether English, Spanish, or American, is hardly ever accepted as legal tender, and it is only in the settlements around the Spanish colony in Tomil bay the natives have learned to recognize its value.

There is yet another treasure highly prized in Yap, but which from its comparative rarity is seldom bartered. It is a coarse shaggy white mat, resembling nothing so much as goat or dog's skin; it is made from the beaten-out bark of the Kal or lemon-hibiscus tree. It is not for use, but merely for show, and is always kept religiously rolled up in a safe corner. It is exactly the counterpart of the *Ie-sina* of Samoa, a white shaggy mat made out of the fibres of the bark of a species of *Ramie*.

After the reading of the paper, the PRESIDENT said: When Admiral Bridge's paper on these islands was read here twelve years ago, we, to our great regret, had not the pleasure of seeing him, as he had just been appointed to the *Colossus*, and the paper was read by his paymaster, Mr. Matthew. Well, twelve years have elapsed, and now we have the great pleasure of welcoming Admiral Bridge back from his command in Australia, and I trust that he will make up for our great disappointment when his paper was read, by opening the discussion on Mr. Christian's most interesting paper this evening.

Admiral CYPRIAN BRIDGE: I am very much afraid that, when the audience hears the little I have to say, after the very admirable account given us by Mr. Christian, it will be disposed to think that the loss in not hearing me before was somewhat less than your President, in his courtesy, tried to convey. It is now over fifteen years since I visited the Caroline islands, accompanied by my friend Mr. Le Hunte, who is about to leave this country to take up the office of Lieutenant-Governor of New Guinea, in succession to that very distinguished public servant, Sir William MacGregor; Mr. Le Hunte accompanied me as Judicial Commissioner of the Western Pacific. We visited many other groups of islands during our cruise; but it was in the months of June, July, and August, 1883. Therefore, even if I had made myself so thoroughly acquainted with them as to be able to give you any long description, after the very admirable account to which we have just listened, I am afraid my account would be rather like last week's paper after this evening's special edition. With regard to the great buildings on the island of Ponape, Mr. Christian has not dealt at any length upon the immense amount of work that he must have carried out in order to see the ruins at all; because the luxuriant vegetation of these tropical islands has nearly covered all these ruins, and a not very observant visitor might go there, and never know there were such things. The photographs he has shown us this evening can only have been taken as a result of a vast amount of clearing away. His plans are probably the first approaching anything like completeness that have been made. There are earlier plans, as the ruins were first described by the eminent Polish naturalist, Mr. Kubary, whose acquaintance Mr. Le Hunte and I made at the Pelew islands, and whose decease I have heard of with regret. He was only able to investigate a portion of them; and if anybody is curious in the matter, he will find a detailed account of his exploration in a book in German, called an 'Essay on South Sea Curiosities,' by Steinlitz and Kreuse, published at Hamburg in 1881. The "Cemetery

of the Little People" I fancy Mr. Christian is the discoverer of; as, though having visited Ponape, I never heard of it until this evening, and I can easily understand, from the Metalanim rocks which are close to the sea, the great difficulties he had to overcome before making the plans we saw just now. I am not sure that I understood Mr. Christian aright, but I fancy his opinion is that the ancestors of the present natives were the builders of these great ruins. I should be very reluctant to appear to hold an opinion on such a subject contrary to any conclusion arrived at by Mr. Christian, but I confess it seems to me almost impossible. Not only are the buildings great artificial structures, but the very islands on which the buildings are made are artificial; and that vast area, I think about 3 miles square, of which Mr. Christian gave us a plan, is itself entirely artificial; so that this Microsnesian Venice has had even less help from nature in the way of construction than the Venice in the south of Europe. The structures themselves are of great size, and the materials of which they are composed are of the most massive description. I think Kubary estimated that some blocks of stone must have weighed 7700 lbs.—over 3¾ tons. As Mr. Christian told us, these hexagonal basaltic columns are quarried 30 miles away. Now, it is inconceivable to me, having seen the natives of Ponape, that they ever got these great masses from the quarry to the places where the structures are, much less build the structures. In the same way, in the island of Lele, the ruins are of a totally different character, built, not of basaltic prisms, but great irregular blocks of stone, some of very great size. The ruins differ essentially from those on Ponape; they are on the land, and the others are in the water. It seems incredible, no matter how much you allow for national degradation and forgetting the arts of their ancestors—no matter how much allowance you make, it seems to me incredible that any people of the present race should have constructed these immense works, of which we see the remnants. There is something to the white man very comforting in that belief. Wherever we go throughout the South Sea islands, we find the native populations diminishing. I believe I alluded to this in the paper to which your President referred just now. There were then two exceptions when I was at that time in the Pacific—Wallace Island, now under the French, and Savage Island, which lies to the east of the Tongas. I was at Savage island again three years ago, and I regret to say, having landed on the island, where they are all Christians, and many speak English fluently, I found that the population was diminishing; and I was told in Samoa, by the French Catholic missionaries, that the Wallace island people were diminishing also. It appears likely, then, that these great ruins were built by a race entirely passed away; which had not only diminished, but had disappeared long before any white man visited the islands; and it is comforting to think that the diminution and approaching disappearance of the present Pacific races is in no way attributable to us, but was probably going on long before we appeared on the scene. The builders of these immense places, like the mound-builders in the Mississippi valley, or Yucatan, and Central America, investigated by Mr. Maudslay, have disappeared quite independently of contact with any white people. I have only a few words to say about Yap, and these great stone coins or pieces of money, so well delineated in the photographs. They are made of stone not found in the island of Yap; it is found in the Pelew islands, 200 miles distant; and when my friend and I were in the Pelew island in 1883, the king of Korror allowed a hundred Yapmen, who were replaced from time to time, so that the number was always kept up to about a hundred, to live in his territory, to quarry these great discs of stone and send them over to their own island. At the present day they are carried across in schooners. We saw several 6 feet in diameter, and estimated the weight at over 3 tons; but we were told of one which was

over 9 feet 4 inches in diameter, and estimated to weigh 4 or 5 tons. Now, it is quite mysterious how these things were conveyed across 200 miles of ocean before the white man's schooners had come. They do move them about in Yap, between canoes; quite a fleet of canoes is required for them. That would not do across the open ocean. But, as some of the stones are very old, it is certain they came over before the schooners arrived; how they can have been brought is another mystery of the Pacific. I am afraid that, considering how very little information I have conveyed, and how very little I have supplemented what has been so ably told us by Mr. Christian, I have occupied your time rather longer than I ought.

The PRESIDENT: We have the pleasure of welcoming here this evening the new Governor of New Guinea, and we hope that accounts of any exploration undertaken under his auspices will be sent home by him to us in correspondence. Mr. Le Hunte accompanied, as deputy commissioner, Admiral Bridge when he visited the Caroline islands in the *Espiegle*.

Mr. LE HUNTE: I was not prepared for this distinguished reception to-night; I am sure, after what we have heard from Mr. Christian and Admiral Bridge, I should only be repeating and taking up your time unnecessarily. It has recalled to me one of the most interesting and pleasant times I can remember, that cruise of five months through the Western and South Pacific, and especially our visit to Kusei and Ponape, in the Carolines. Nothing can really convey, not even the words of the lecturer or the photographs or Admiral Bridge's speech, their beauty, which was marvellous. The vegetation is most beautiful. I found a magnificent red "Ixora" in one court of the ruins. I don't know whether it existed when Mr. Christian visited the place, or whether it fell a victim to the necessities of making room for the camera—a scarlet waterfall of flowers. [Mr. CHRISTIAN: It is still there.] I can quite understand the difficulty he found in clearing the ruins, because it was really a work of some difficulty, if not danger, to explore them, for I know nothing so hard as to sit down suddenly on one of these basaltic columns, hidden by creepers, and covered with slippery moss, and you sit down pretty frequently. I have no pretension to understand or be able to discuss the scientific questions. I was accompanied in my rambles about the ruins by a humorous though somewhat silent native of New Caledonia, and we were both of us extremely puzzled as to the builders of this marvellous sea city; but my friend "Joe" solved the difficulty by turning on his heel and remarking, "Debble, he build um." I could not go any further. I am inclined to agree with Admiral Bridge, with deference to any better opinion, They could not have been built by any races we saw, or any linked to them as natural predecessors; they must have been, I think, a separate race altogether. One thing I noticed was that all the defences faced seawards, and not inland, which to some extent shows that they were built by residents, and not by people attacking the island from the sea. On our visit to Yap we saw the extraordinary collection of stone money, which is perhaps not the right word; it is a token rather than a medium of exchange. At great festivals they interchange them, not in the same way as barter, but in the same way as the Fijians will exchange whales' teeth; they represent a value we can put no estimate upon. As Admiral Bridge says, they come from the Pelew islands. We saw scores of these enormous millstones in front of the king's treasure house at Yap. This evening's lecture has brought back most vividly to me a most interesting visit to these islands. As your President has alluded to the work I am going to, I may say I look forward most heartily with interest and zest to seeing further mysteries, and taking a very humble part in their elucidation.

Mr. A. P. MAUDSLAY: After hearing three people who have been to the Caroline islands, I cannot add much to the discussion. I took part in the discussion

on our previous paper, and then expressed a hope that some one would soon arise to give us an account of the ruins at Metalanim. We have had to wait fourteen years, and are proportionately thankful to Mr. Christian for what he has told us. I am glad to hear that Mr. Christian will very likely return, and as he has told us there are something like 11 square miles of ruins, there must be a great deal of work still to be done. Now, in one way I sympathize with him very much. When he went to the Carolines, he went principally with the idea of studying the languages, and not the ruins; and I have been placed in very much the same circumstances myself. When I first came across a ruin in Central America, I did not know what to do with it; it looked very big and very formidable, and I did not know how to set about recording my observations. Luckily for me, when I came home I fell into the hands of Mr. Coles, and anything I have since been able to do has been much owing to the instruction he gave me, and the advice I received from the officers of this Society. Now, we do very much want a still further exploration of Metalanim, and I trust Mr. Christian will put himself in Mr. Coles's hands, and bring us back in a year or two a very detailed plan of this town of 11 square miles. It is a big job, and it will take him, I am certain, more than one season. With regard to the ruins themselves, one speaks of masonry, but there appears to be no sign of tool-marks on the basaltic rocks; they are treated much as logs of wood, one piled up on top of another, and I believe the only implements Mr. Christian found are those very interesting shell axes. In those graves which Mr. Christian opened he found some bones in such a condition that they hardly seem to imply a very great age; however, one skull only is so far perfect that we may be able to get correct measurements; but if he will go back and again tackle the graves which still remain unopened, we may be able to get hold of some skulls that will tell us at least what people they were for whom these tombs were built; and that, I take it, is one of the most important works that lie before him. I can't say how much I envy him the chance of going back to Metalanim, and having another turn at those ruins. I am sure we shall encourage him to do it as soon as possible, and bring us back again as interesting results as we have now.

Mr. Hercules Reid: It is with considerable diffidence that I rise to say anything of this matter. Mr. Maudslay said he was diffident, but he at least has been in the Pacific; I can make no such boast. There is one point, I think, that is perfectly clear—that is, from the position of these islands, as you see on the map, there is every probability of the race being a mixed one, and from Mr. Christian's account it appears that the natives' opinion is that the earliest race was one of dwarfs or negritos; then followed a race of giants, after them came cannibals, and then I think the present inhabitants. That is as I understand Mr. Christian's account. Now this, I think, has many factors in common with the traditions that we find all over the world, not excepting our own country. We see evidences in the photographs that Mr. Christian has shown us, in the stories that he has told us, of the varying influences of these different races who at one time and another came from the west and the south, or possibly from the north. I think the nearest existing negritos are in the Philippines. The type of house that we see in the photographs, with the high-peaked ends, are precisely the same as are found in the south-east peninsula of New Guinea. Certainly I think those present who know the Melanesian type will agree with me that many of the types in the photographs are Melanesian. We have every possible type that could be expected in islands such as they are, and for that reason I am afraid, even if the skulls be brought here, we shall get only a confirmation of what would be possibly the case. Of course such a confirmation is very important, and it may confirm what we already guess; it may also give us some ideas we did not

possess about those islanders. Now, there is one point that Mr. Christian has rather insisted upon, and that is the Japanese type of these megalithic structures. For my own part, I must confess I cannot see necessarily any Japanese influence at all. It is quite possible that the Japanese may have come down to these islands; it is historically certain that they did come down to the Philippines; but if you look at the map, that was simply a coasting voyage. If they had gone out to the Carolines they would have had a very different trip indeed, and before assuming such influence it would be well to find some further confirmation of it. These structures, which are, of course, the most interesting feature of these islands, may properly be called structures on the timber plan, very like log huts; as Mr. Maudslay said, there is no sign of tool-marks upon them. They are simply piling Pelion upon Ossa. In that they differ from some others found in the Pacific, notably in Tonga, where in one well-known instance, most frequently photographed, there is a kind of slot in the lower stone into which the upper stone fits. Now, that shows a considerable advance in culture over the piling of one stone upon another, just as trunks of trees would be piled. I think it is very improbable that, even if the Caroline islanders wished to work these stones, they had anything with which they could do so; of course, these fine shell axes are excellent for wood, but I think against these basaltic columns they would be quite ineffectual. Now as to the question who were the builders. I shall not detain you long. For my own part, I do not see any reason whatever why the present inhabitants of the Caroline islands should not be the descendants of the people that made these buildings. That, as you know, is contrary to the views of two-thirds of those present who have spoken on the subject; but I think the evidence that Admiral Bridge himself gave us is something toward a solution. He told us that these stone discs, of an enormous weight, were brought by somebody from the Pelew islands, and I think, if these things now have a common value to the existing islanders, the probability is very great that they were made by their ancestors, and if so they were brought from the Pelew islands by the same people. Now, if they could bring these enormous weights from this distance, surely they had engineering skill enough to put these stone columns one upon another. I may cite, in illustration of my hypothesis, the present inhabitants of Egypt; would anybody, without knowledge, suppose that they were capable of building the gigantic and artistic structures to be found there? I don't think this at all an unfair analogy, and I think in this particular instance that it is not at all strained. With regard to the Japanese theory, there is only one view I saw in the whole series that could be at all compared with Japanese work; that was a doorway with the ordinary horizontal lintel, which is exactly like the entrance to a Japanese dolmen, and equally like that of a dolmen in Brittany. There are many points that might be alluded to in this very interesting paper. I think that Mr. C. F. Wood's visit to the islands about 1873, and published in 1875, gives probably the best account of these extraordinary ruins. He was only in a small yacht, and had no crew sufficient to clear away the undergrowth, and made no excavations, but observed the structure, etc., very well. Up to the date of the publication of that book in 1875, I think his was quite the best account that has been published. The Duke of Wellington said that the battle of Waterloo was won in the playing-fields at Eton; here we have an exploit of a much more pacific character, which had its origin in the same training.

Mr. CHRISTIAN: With regard to what Admiral Bridge said, I want to say three or four things. First of all, the natives of Ponape are still clever architects. The photographs show us buildings in the same fashion as the walls at Metalanim, and there are several such indications along the coast which have been omitted. There is

one where the masonry is very much the same; and certainly more recent than Metalanim; other ruins found on the island of Tapak are modern too. I think the builders were an intelligent minority swaying an ignorant majority. Yap traditions about the stone money go back a long way before there was any war in the land. They say after the invention of stone money civil war broke out.

With regard to bringing these masses of masonry into position, I think very likely it was done by a large number of men hauling them up over coconut trunks covered with oil to avoid friction. The point I considered Japanese as well as the great entrance was the projecting eaves or cornice that I have seen in Osaka and Kioto. The fashion of the mat, I was told by a Japanese the other day, was distinctly Japanese, as is their method of dealing with the banana fibre. I really think Mr. Reid was right in his parallel between the poor wretched fellaheen of Egypt to-day and the people under the Pharaohs long ages ago, and we must remember what Prescott has told us that nations fall to decay very quickly.

The PRESIDENT: It now only remains for me to propose a vote of thanks to Mr. Christian for his most interesting paper. It will have been new, I am sure, to most of the audience that there are existing such massive Cyclopean structures in these small and distant islands. They reminded me of what I used to study years ago in Captain Cook's voyages, of the great stone idols and platforms on Easter island, and I even used to have a suspicion that there had been connection between Easter island and the civilized peoples of South America. Though it seems most probable that the massive structures in the Caroline islands were built by ancestors of the present inhabitants, I do not believe it is altogether impossible that they were inspired by a visit of a higher race. We must all have been struck by the care and diligence with which Mr. Christian has examined and made plans of these ruins, and also with the excessively hard work which he must have gone through in clearing his way to them. We trust that he will complete his work in those islands when he returns, and that we shall have the pleasure of seeing him here again, and I hope, as Mr. Maudslay suggested, that before he goes he will make the acquaintance of Mr. Coles. I now have the pleasure of proposing a vote of thanks to Mr. Christian for his paper, and for the illustrations which accompanied it.

CAPTAIN SVERDRUP'S EXPEDITION TO NORTHERN GREENLAND.*

CAPTAIN OTTO SVERDRUP'S polar expedition, which left Christiania on June 24 last year, has for its principal geographical object to ascertain the extension of Greenland towards the north, to determine the yet unknown configuration of the coast of its mainland, and, if possible, to discover whether this great arctic land finally breaks up into groups of islands in the north.

The ship used in this expedition is the *Fram*, so well known from

* The following account of the objects and equipment of Captain Sverdrup's expedition in the *Fram* to the north coast of Greenland has been forwarded to the President by Consul Axel Heiberg and MM. Amund and Ellef Ringnes, who contributed handsomely to Dr. Nansen's expedition, and who are generously bearing the entire expense of the present expedition in the *Fram*, the ship itself being provided by the Norwegian Government.

Dr. Nansen's famous polar expedition. It is the intention of Captain Sverdrup, with the aid of this ship, to force his way through Smith sound and Robeson channel as far north along the coast of Greenland as possible. Should it prove possible to take the *Fram* round the northern coast of Greenland and over to its eastern shores, this will be done, but the expedition did not base any positive calculations on this remote possibility. When the *Fram* has been forced as far north as the conditions will permit, the ship is to serve as headquarters for sledge expeditions for further exploration.

The principal purpose of these expeditions will be to explore and map out the northern mainland coastline, and to make an attempt to connect Cape Washington, the most northerly point known on the west coast of Greenland, with Independence bay and Cape Bismarck, the extreme northern points on the east coast. In case such an expedition should succeed, the Danish Government has, in Scoresby sound on the east coast, generously placed at the disposal of the exploring party a depôt of provisions left there by Lieut. Ryder's expedition 1891–92. The explorers will here find a place of refuge where they can make their winter quarters, if they wish, in order later on to return or to proceed southward to more civilized regions, as circumstances may render advisable. With the *Fram* as starting-point, other sledge expeditions will be sent out to explore the archipelago which may exist north of Greenland, and to make other more special investigations. This is, in short, the geographical programme of the new Norwegian arctic expedition, so far as it can be approximately outlined in advance.

The crew consists of sixteen members, not less than six of these being men of scientific education. Geology, botany, zoology, are all represented by specialists. The astronomical, magnetical, and other physical observations (among which are observations with Sterneck's pendulum),* will be taken by a naval officer, assisted by an officer of the army, who, besides, will attend to cartographic work. The expedition is also accompanied by a scientifically educated physician, who, among other things, takes care of the meteorological observations.

On board the *Fram*, as well as on the various sledge expeditions, there will be made as many specific scientific investigations, and as much scientific material will be collected, as the circumstances will admit. Particular attention will be paid to all glacial phenomena, and it is one of Captain Sverdrup's main objects to obtain a thorough

* Dr. Nansen also had a Sterneck pendulum on his arctic expedition. Lieut. Scott Hansen took with this pendulum on the ice, as was demonstrated later on, some very correct observations of gravitation in the polar region. This was the first time observations of this class were taken on the ocean. Dr. Nansen does not speak of them in his book, as he was not yet certain as to their correctness. By subsequent calculations their correctness has been fully established.

knowledge of the exact nature of the so-called palæocrystic ice, found in these regions, of its origin, formation, and drifting.

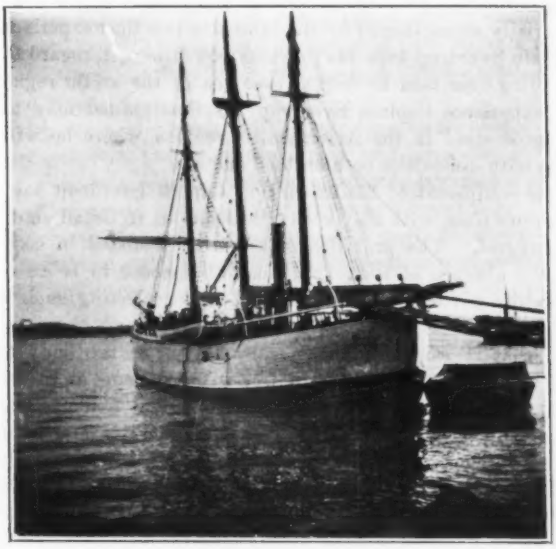
This polar expedition must be regarded as a natural continuation of the previous arctic explorations, under the leadership of Dr. Nansen, viz. the ski expedition across Greenland in 1888, and the *Fram* expedition in 1893-96, of which expeditions Sverdrup was a member. Of the latter he was second in command, and succeeded Dr. Nansen as commander when Nansen and Lieut. Johansen started out on their journey over the polar ice. By these expeditions important parts of the great polar problem have been solved, and it is now Captain Sverdrup's ambition to give to Norwegian arctic exploration, which has already produced such important results, a wider range, so as to complete in a measure what has been so well begun. To make this better understood, a few general remarks will perhaps be permissible.

The arctic researches of our times have been confronted with two conspicuous geographical conditions. Firstly, there was on the American side of the polar region a vast arctic continent—Greenland—the interior of which was wholly unknown, and the northern limits of which are still unknown. The second condition was the appearance of sporadic land-formations in the European-Asiatic polar regions, and the question would naturally arise, whether these continued sporadically in a northerly direction, and were finally connected with the possible offshoots of Greenland; in short, whether in the vicinity of the pole there was land or water. Dr. Nansen, in whose vivid, active mind the polar question early assumed a well-defined form, was first attracted by the mysteries of Greenland, that great, silent arctic country, whence the mighty icebergs break away and float with the currents from the north. What were the dimensions and extent of these vast masses of ice? What was the nature of the interior of this country? This, and similar questions, were in the main answered by his journey across Greenland ten years ago. But the question as to the northerly extension of this great white continent still remained unanswered.

Indeed, this question of the insularity of Greenland so much occupied the thoughts of Dr. Nansen that, having completed his journey across its glaciers, he for a time contemplated the fitting out of an expedition to solve that problem. Meanwhile, he preferred to engage at once in the solution of the other great polar question—the character of the vast region on the European-Asiatic side, our knowledge regarding the extension of land and water in which was still more imperfect than on the American side. The further investigation of Greenland he put aside for resumption at some future time.

The *Fram* expedition of 1893-96 established the fact that the European-Asiatic side of the polar region consists of an extensive, deep ocean, covered with drifting ice. The drift of the ice, and the great depth of the sea in the highest latitudes, make it, according to Dr.

Nansen, very probable that this ocean extends beyond the pole, and that the continent of Greenland, or its possible groups of islands to the north, cannot be presumed to reach a very high latitude. To solve this important problem is, then, the principal object of the expedition under the leadership of Dr. Nansen's able first officer. Captain Sverdrup has himself conceived the plan. It has grown on him ever since he enlisted in Dr. Nansen's first expedition across Greenland. Besides the broader views of the polar problem, mentioned above, Captain Sverdrup would naturally, from a number of circumstances observed during the *Fram's* long drift in the polar ice, be strongly interested in a further and more exhaustive exploration of the arctic regions on the American side.



THE RECONSTRUCTED *FRAM*.

Foremost among these was the ice problem. According to a theory generally adhered to, the European-Asiatic side of the pole consisted of a shallow body of water, covered with a stationary coating of ice. Instead of this, a vast, deep ocean was found, covered with drifting ice of local formation and of comparatively recent date, generally not more than five years old. The question then arose, What are the conditions as regards the formation and drift of the ice on the American side, influenced as it might be by unknown lands and ocean depths of a vastly different magnitude?

The ice conditions on the American side of the arctic region seem on the whole to be considerably different from those on the European-

Asiatic side. In the latter region we find only comparatively thin drifting ice, whilst in the former there seems to be much thicker and more stationary ice, the palæocrystic ice. Many interesting peculiarities, both in regard to formation and drift, may here be found, and the observation of these and other phenomena in connection with the exploration of the configuration and extension of the coast-lines, etc., will undoubtedly result in greatly increased knowledge of the entire arctic world. And in the interest of science, it must be looked upon as a fortunate circumstance that the same man is afforded an opportunity to make comparisons by direct observation between the conditions on both sides of the pole.

The chances of a successful issue of the present expedition will also be materially strengthened by the extensive practical experience gained by Captain Sverdrup from his previous expeditions, in regard to methods of travelling over land as well as over sea in the arctic regions. The double experience Captain Sverdrup has thus gained may now stand him in good stead in the American ice regions, where he will have to struggle with difficulties both on land and sea.

In the equipment of his expedition Captain Sverdrup has followed Dr. Nansen's plan, with only such modifications in detail as experience would suggest. The provisions taken are calculated to last for four years—the absence of the expedition is supposed to be two or three years—while particular stress was laid upon selecting such a variety that a monotonous menu would be impossible, and the fare of such quality, that it would at once ensure health to the body and good humour to the mind during the contest with the long arctic monotony. It stands to reason that these provisions to a great extent consist of all kinds of canned goods, meat, fish, soups, vegetables, and delicacies of every description. A considerable quantity of Prof. Waage's fish-powder —dried pulverized fish—which on the former polar expedition proved an equally nutritious and palatable food, was also taken. This fish-powder is very convenient for sledge expeditions, and can be used in different ways, as pudding, soups, etc. Instead of American canned meat, used by Dr. Nansen, Captain Sverdrup has furnished his expedition with partly Danish, partly Norwegian canned meats. The crew will be treated daily to fresh baked bread. Besides a large quantity of flour for baking purposes, a considerable amount of biscuit was taken to serve both as a change in the bread diet and as a reserve. To this was added the finest Danish butter, Norwegian canned milk, chocolate, and coffee. In provisioning the former expedition, Dr. Nansen enforced the most rigid prohibition as to alcohol, while the use of coffee was reduced to a minimum. After some time his stock of coffee gave out, and the crew thought it hard to be deprived of their coffee, the use of which is so very common in Norway. To avoid a similar experience, Captain Sverdrup has taken a sufficient supply of coffee to allow each man his

daily drink of this beverage. On board the ship there is a stock of liquor comprising about 170 bottles of cognac. It was demonstrated on the former expedition, that one of the greatest difficulties to contend with was the arctic monotony and its depressing influence on the mind. A festal gathering now and then around a social glass tends to relieve the monotonous uniformity, and to bring about a change in the daily routine; it will be admitted that 170 bottles divided among sixteen able-bodied men over a period of three or four years, can hardly afford an opportunity for abuse. A sufficient supply of tobacco was also laid in for the use of the members of the expedition.

For the intellectual diversion of the expedition, a library of several hundred volumes, consisting principally of books used on the former expedition, was taken. A considerable number of new books was added, however, and the saloon furnished with a piano for the musical entertainment on board.

It will be remembered that the Nansen expedition used electricity for lighting purposes, the power for which was generated by a windmill. The light was pleasant, but the machinery occupied a great deal of much-needed space, and required very minute and close attention. Captain Sverdrup decided to use petroleum, both on account of the reason stated above and because it produces heat as well as light at the same time. Even the cooking is done by petroleum, thereby saving for other purposes space that otherwise would have been taken up by coal and coke. The kitchen stove is constructed on the so-called Primus principle, the oil being transformed into gas before it reaches the burners. For the ship's boilers, on the other hand, coal is used exclusively, petroleum having given rather unsatisfactory results on the former expedition.

Another departure from the Nansen equipment, made by Captain Sverdrup, is the use of 6½ mm. Krag-Joergensen rifles, while Dr. Nansen used 8 mm. size. Thus a considerable saving is effected in the weight of ammunition, which is of particular importance in the making up of the sledge-expeditions. In this connection, it may also be mentioned that Captain Sverdrup carries with him an ample supply of gun cotton and gunpowder for ice-breaking. The excellent manner in which Captain Sverdrup succeeded in getting the *Fram* out of the polar ice was in no small degree owing to the use of submarine mines, laid under the direction of Lieut. Scott Hansen. Captain Sverdrup is prepared to make liberal use of this method, should it prove necessary.

The outfit in regard to ski, snow-shoes, sledges, and kayaks is in all essential features the same as used on the last expedition. A few modifications have been effected in the construction of the sledges, in order to increase their durability in crossing the rough ice-field. Of particular interest is the change made in some of the kayaks. Dr. Nansen and Lieut. Johansen found, during their long wanderings over

the ice-fields, that it was frequently necessary to transport the boats on the sledges over the solid ice, next to transport the sledges on the kayaks over the open lagoons between the ice-floes. To avoid loss of time as much as possible in changing about in this manner, Captain Sverdrup has furnished his boats with runners. When the kayaks are transported over ice, they slide on their own runners, with the keel turned up. When open water is reached, the kayak is simply turned over into its natural position as a boat, with the keel in the water.

The *Fram* has also undergone some changes, mainly with a view to obtain better accommodation for the crew. Under the old arrangement the crew had their quarters in the stern, which rose considerably above the fore part of the ship. Captain Sverdrup has had the whole of the fore part built up in line with the aft section. On the top of this reconstructed fore part he laid a new deck, and below this he had accommodations fixed up for a part of the crew. Below this deck are located the laboratories and cabins for the scientists as well as for the officers, and a saloon to be used as a drawing-room for the entire crew. Aft of these accommodations is a roomy place, where all the mechanical work is attended to. Adjoining this is the galley, where the food of the crew is cooked and prepared. Aft of these new sections, and lower down in the ship, are located the old salon and cabins of Dr. Nansen and his fellows. These cabins, which are supposed to offer more resistance to the cold than those newly constructed in the fore part of the ship, are principally occupied by the more subordinate part of the crew.

The rebuilding of the *Fram* was left in the hands of Colin Archer, the constructer of the vessel.

On Dr. Nansen's expedition the principle of democratic equality was enforced to its extreme point. Every member was placed on the same level and performed the same duties, and as every one was compelled to share in the daily routine work, so they were all entitled to the same privileges. Captain Sverdrup, while not breaking with a principle that produced such excellent results, has, however, in the present instance, found it advisable to modify Dr. Nansen's system to a certain extent. He has, as mentioned above, installed the officers and scientific members of the expedition foreward, while the rest of the crew are given quarters aft by themselves. The scientific members are thus enabled to pursue their special line of work quite undisturbed, while the others are relieved of any feeling of intrusion. The ordinary good fellowship and mutual interests are maintained by the common mess and by other special gatherings.

In manning the expedition, special consideration was given to securing men of as uniform education as possible. With perhaps the exception of two or three men, all the sixteen members of the crew have graduated from some higher, lower, or special institution of learning. As another striking fact it may be mentioned that a great number of

the men are married. An effort was made to secure unmarried men for the expedition, but although several hundred applied, they were mostly found to be married. Two bachelors who were among the accepted ones, and who, on account of their singleness, were pointed to with particular pride, went off and got married directly before the expedition started.

At the farewell dinner in honour of the expedition given by the Norwegian Geographical Society, Dr. Nansen proposed the following toast to Captain Sverdrup:—

"I have to confess to a most unusual sentiment this evening, as my old friend and comrade stands ready to depart in the same ship and for the same northerly destination, where we spent so many days in each other's company. Many are the memories which this evening recalls to my mind from the time we were together. I am particularly reminded of the time when I was preparing to start on my Greenland expedition. Sverdrup had applied for permission to join. I received one day a letter from an unknown man, signing himself Otto Sverdrup. I made the usual inquiries, resulting in such information that he was immediately accepted. I need not say that I never had a chance to regret this choice. I have often been thinking how the fates of two human beings are sometimes interwoven. That accidental meeting was destined to become momentous, not only to ourselves personally, but also to the country. It was then Sverdrup formed his attachment for the life up north, where his life-work undoubtedly lies marked out, in the performance of which a little more than ordinary courage and presence of mind is required. Among the many memories from the Greenland expedition, I am at this moment particularly reminded of Sverdrup's famous night watch on the drifting ice-floe, when the entire expedition seemed to be left no alternative between drifting out on the ocean or being crushed among the ice-floes. When, after that solitary watch, I asked Sverdrup how he had passed the night, he said, 'Oh, it looked quite bad for a while, with an iceberg outside threatening every moment to crush down on the floe; but what would have been the good of it if six men had been standing glaring at it instead of one?'" Dr. Nansen next referred to the second polar journey, and spoke of the splendid manner in which Captain Sverdrup had taken the *Fram* out of the ice as an accomplishment that stands without a parallel in the history of polar exploration. "And when Sverdrup now once more is starting out, we all know that the expedition is safe, and that it will return, because we know Captain Sverdrup is keeping watch, that he is at the helm. It is superfluous to tell him; he knows that all my best wishes follow him. Many a winter eve my thoughts will turn tenderly towards the far north, and my heart beat faster for those who are there."

Captain Sverdrup's second in command is Lieut. Baumann, of the Norwegian navy. He has charge of all magnetical and astronomical observations. He is assisted by Lieut. Isachsen, of the army. The latter also attends to the cartographical work. The zoology is attended to by a young Danish scientist, Mr. Bay, who in 1891–92 was a member of Ryder's expedition to the east coast of Greenland. The botanical work is placed under the direction of Mr. Simmons, who is a specialist on sea algæ; some years ago he made a botanical expedition to the Färoe islands. The geologist of the party is Mr. Schei, a graduate of

the geological and mineral faculty of Christiania University. Mr. Svendsen, the physician of the expedition, who also has in charge the meteorological observations, is a graduate of Christiania University.

The expedition left Christiania on the 24th, and Christiansand on June 27. On July 28 they arrived at Egedesminde, Greenland, after a comparatively rough journey and continuous contrary winds, causing much delay and annoyance. At Egedesminde thirty dogs, procured for the expedition by the kindness of the Royal Danish Trading Company of Greenland, were taken on board. On July 30 the *Fram* arrived at Goodhavn, where other thirty-five dogs, also purchased by the Greenland Company, were added to the stock already on hand, and where the ship coaled for the last time.

At Upernivik, where the expedition arrived on August 4, another batch of dogs was received, increasing the total number of these animals to about a hundred, including fifteen dogs taken from Norway. The expedition should have left Upernivik on August 5 for the far north. Upernivik is the station where the expedition was last heard from. According to all reports so far received, either from the leader or his associates, it appears that the prevailing sentiment on board is one of mutual satisfaction and good cheer.

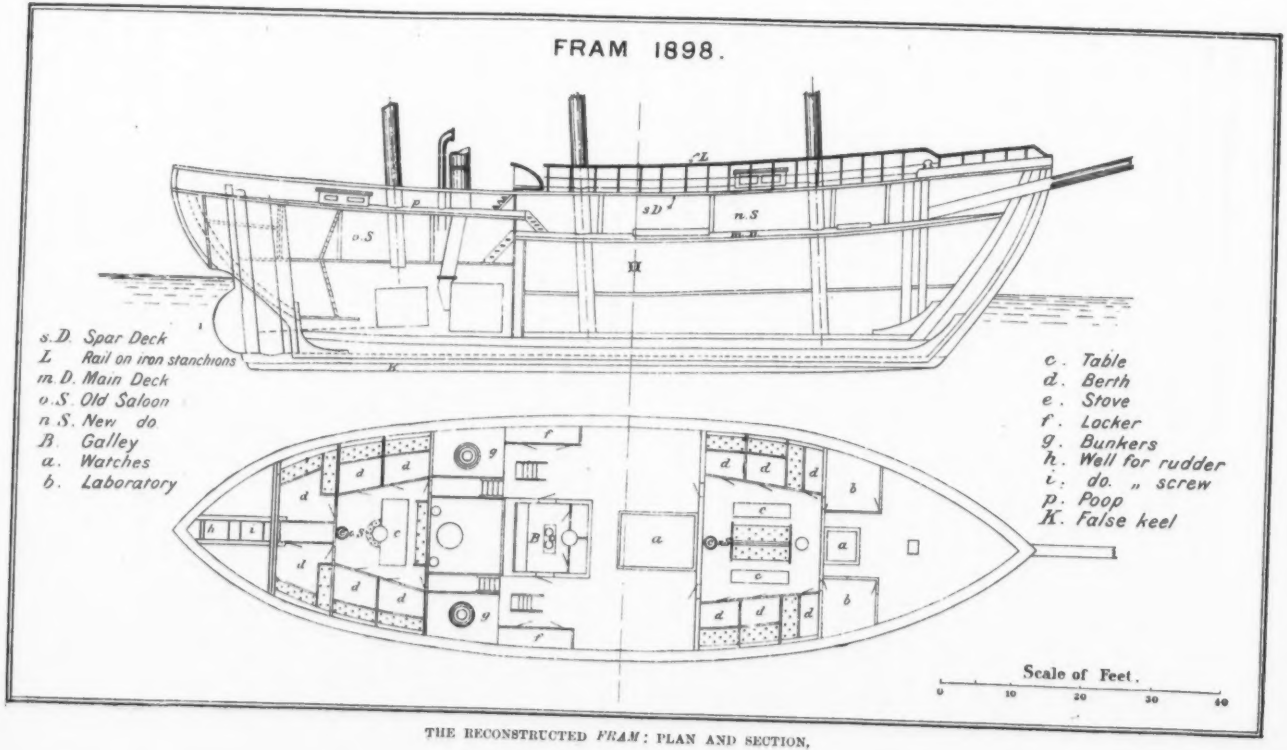
It was the intention of Captain Sverdrup to leave information as to the fate and progress of the expedition at the following points: Littleton island (principally on the south side); Crozier island, or Franklin island, or Cape Constitution (in any case at southernmost point); Polaris House (on the south side of Newman bay); Cape Sumner (the northernmost point); Cape Brevoort (on the north side of Newman bay, at the most extreme southern point); Cape Stanton (at the extreme northern point); Frankfield bay (on the promontories at both sides of the bay); Cape Bryant (extreme northern point); Cape Cleveland (extreme northern point); Cape May (extreme north-westerly point); Cape Britannia, Cape Fredrick, Cape Neumayer, Cape Ramsey, or Mary Murray island, or Lockwood's farthest.

The Danish Government, as already will be seen, has shown great interest and kindness towards the Sverdrup expedition, and the Government has also given orders to all Danish officials in Greenland to assist the expedition in every possible manner.

The *Fram* is owned by the Norwegian Government, which also furnished the money for her reconstruction, while the expenses of the expedition are defrayed by Mr. Consul Axel Heiberg and Messrs. Amund and Ellef Ringnes.

It was a special wish of Captain Otto Sverdrup that his plans should be laid before the Royal Geographical Society.

Appended is a description of the reconstructed *Fram* by Mr. Colin Archer:—



THE RECONSTRUCTED *FRAM*: PLAN AND SECTION.

The *Fram* was built in 1892, specially for Dr. Nansen's expedition to the north polar regions. This expedition was planned on the supposition, which subsequent events have amply verified, that a polar current would carry the ship along with masses of constantly shifting ice from the tracts in the vicinity of the New Siberian islands to the east coast of Greenland. On this assumption the ship was designed. Great strength and power of resistance to ice-pressure were therefore the considerations which overruled all others in her construction. But while the event seems to prove that it is quite possible to build a ship sufficiently strong to resist any pressure to which she is likely to be exposed in the north polar seas without sustaining material damage, the experiences gained on her three years' cruise also confirmed the supposition to which her model naturally gave rise, that she would not be a comfortable ship in a heavy sea; her great beam would cause her to roll heavily, while her low freeboard would cause her to ship water freely over her decks. It was also found that her accommodation was rather confined even for the crew of thirteen men, which then formed her complement, and that with a larger crew it would be necessary to provide more room. The *Fram* was originally built with a raised poop extending over about two-fifths of her length from the stern to the mainmast. Under this raised deck the cabins were situated, and under them the engine-room. The main deck was 3 feet lower than the poop, leaving less than 2 feet freeboard, when the vessel started on her first voyage. While frozen in and embedded in the polar ice, an awning was rigged over the main deck, which proved sufficient to prevent the ice accumulated round the ship from filling the decks, but which nevertheless would have been but a frail protection had not the vessel, from her peculiar construction, risen so readily when nipped in the ice.

It was with a view to remedy these defects that Captain Sverdrup determined, before starting on his present expedition, to add an upper or spar deck, extending from the engine-room right forward to the bows. By this means the freeboard amidship was increased by fully 6 feet, the top sides of the vessel being extended up to the new deck. The increase of freeboard will, it is thought, tend to somewhat diminish the rolling, but even if much improvement is not to be looked for in this respect, it will certainly add very much to the comfort of the crew, and even to the safety of the vessel in a heavy sea, as it will prevent large quantities of water from accumulating on her decks. The want of available space for the crew was also completely remedied. The length of the new between-decks is about 68 feet, and as it is over 30 feet broad amidships, it will be seen that a very large space would become available for cabin and other accommodation. The annexed sketch will show how the new cabins were arranged. The space between the main and fore hatch from side to side was converted into a roomy saloon in the middle, with three berths on each side. These were appropriated to the use of the leader of the expedition and his scientific staff, while the rest of the crew occupied the original cabin aft. Abaft the main hatch a spacious gallery was built amidships, leaving a free passage on either side to the upper deck and to the old cabin. In front of the cabin on either side compartments were divided off, intended to serve as workshops or laboratories. The spaces on both sides of the main hatch was left open for stowage, etc.

In order to make this added accommodation as impervious as possible to the cold, without adding too much to the weight of the vessel, a light panelling was added about a foot from the ship's side in the wall of the cabins, and the space between the panelling and side was filled with cork shavings. The athwartship partitions were, for the same reason, built in three layers of panelling lined with thick paper, and with an open space between, which was filled with cork. An

extra ceiling was also added between the upper deck beams, and the space between the ceiling and deck filled with the same material. The saloon, as well as the side berths, receive their light from a large double-glazed skylight over the middle of the saloon, no bulls-eyes or side lights being fitted, in order to reduce the radiation of heat as much as possible. A good stove is fitted in the cabin, with means of ventilation. By these means it is expected that the new cabins, if not quite as impervious to the arctic frost as the old ones, will still be quite habitable and comfortable even in the severest cold.

In order to render the vessel as invulnerable as possible when nipped in the ice, she was originally built with very little of the keel projecting below the bottom planking. This absence of keel had the effect of making her exceedingly quick in turning. If the helm was put hard over even at full speed, she would literally turn round almost in her own length, as if working on a pivot. This property, however valuable when threading one's way between ice-floes, made her difficult to steer in the open, as there was nothing to steady her and keep her in a straight course. To remedy this yawing tendency, and also make her hold a better wind, a false keel was added 15 inches deep at the stern, and tapering to nothing at the fore foot. This keel was fastened with spikes only, not through bolts, so that if caught by the ice it may be wrenched off without seriously injuring the main keel.

The foremast, which was originally shorter than the mainmast, was lifted 7 feet and stepped on the lower deck beams, and it has now very nearly the same height as the mainmast. Before leaving the vessel was hove down to have her bottom cleaned and the greenheart ice sheathing recaulked.

These are briefly the principal alterations effected to render the *Fram* more suited for the work she will be required to do on her second expedition. It is worthy of note that, after what she had gone through on her first voyage, no repairs whatever were found necessary to any part of the hull, no damage having been sustained. No sign of weakness or straining could be found anywhere. All her seams and joints seemed as close as when she was launched, and not a bolt or tree-nail had to be renewed.

EXPLORATION OF THE INTERMEDIATE DEPTHS OF THE OCEAN.*

(Preliminary Report.)

By GEORGE MURRAY, F.R.S.

This expedition, for which funds had been provided by the Royal Geographical Society, the Drapers' Company, and the Fishmongers' Company, sailed on November 15, in the *Oceana*. The party consisted of Mr. George Murray, F.R.S., Mr. L. Fletcher, F.R.S., Dr. Gregory, Mr. V. H. Blackman (all of the British Museum), Captain Bates (navigating officer), Mr. J. E. S. Moore (Royal College of Science), Dr. Sambon, and Mr. Percy Highley (artist). The Trustees of the British Museum granted special leave of absence to Messrs. Murray, Gregory, and Blackman.

By the kindness of Mr. S. W. Silver, the *Oceana* was fitted with her hauling-gear at Silvertown, and it is owing to his interest in the

* Diagram, p. 224.

expedition, and to the endless kindness and resource of Mr. M. H. Gray, that the expedition sailed so perfectly fitted for the work undertaken.

On the passage from Silvertown to Queenstown, every one was fully occupied in unpacking apparatus and fixing it in position in the small temporary deck workroom and in the forehold, etc. The serial tow-nets were towed on several occasions to get the silk properly seasoned, and the sounding-gear, accumulators, etc., were carefully overhauled. In the first of these preliminary tow-nettings, off the North Foreland, a few miles from land, coccospheres were obtained with coccoliths of the type described by Messrs. Dixon & Jolly (*Nature*, September 10, 1897) in Dublin bay, viz. *Coccosphæra pelagica*, Wall. A reference to Messrs. Murray and Blackman's paper on "The Nature of the Coccospheres and Rhabdospheres," in *Phil. Trans. Roy. Soc.*, 1898, will show the interest that belongs to this observation. Finally, the Tanner opening and closing tow-net was carefully adjusted.

A call was made at Queenstown for the parts of the opening and closing tow-net invented by Mr. M. H. Gray a few days before sailing, and unfinished when the *Oceana* left Silvertown. The opening and closing apparatus in this instrument is regulated by a mercury clock, and its adjustment being a matter of great nicety, Mr. Gray determined to give it some further attention, and it was sent overland to meet the *Oceana*. Two special spars, judged necessary for the hauling-gear and sounder, were also obtained, and after two hours in Queenstown the *Oceana* sailed for her point of departure, viz. Tearaght Light, off Dingle bay. This point was selected for several reasons. In the first place, it would be easy in any weather, by day or night, to pick up the indicated 100-fathom line, 25 knots due west of this light, visible 22 miles; secondly, a due west course would follow a line drawn by Admiral Wharton, along which soundings were desirable; and, thirdly, this region was imperfectly known, especially as to the winter fauna.

The object that now engaged all the resources of the expedition was to obtain specimens of the inhabitants of what are known as the intermediate depths of the ocean. It has been generally agreed by naturalists that the surface life extends down to approximately 300 fathoms, and that the deep-sea life rises to about 100 fathoms from the bottom; but two opposed opinions were held as to the question, Are the dark depths lying between these zones inhabited, or are they destitute of living organisms? One party, headed by Prof. Agassiz, contends that these depths are barren of all life; the other, most conspicuously represented by Sir John Murray, believes that they are inhabited. This geographical problem, Is this zone, in places several miles thick, extending over nearly three-fifths of our globe, a desert or not? was to be attempted by two methods: viz. (1) by the use of a series of ordinary tow-nets, towing at ascertained depths, the contents of which should be subsequently carefully analyzed, and the surface forms, as indicated by those obtained.

in the surface nets, subtracted from the total catch of the deeper nets, so as to discount those organisms captured during the descent and ascent of the nets; and (2) by the use of opening and closing nets. Besides the Gray net already mentioned, the Tanner net, on the evidence of which principally Prof. Agassiz bases his contention, was part of the equipment. It is lowered tail first into the depths, so that it can catch nothing in its descent; then towed at the desired depths and closed by the descent along the rope of a messenger, which on striking a hook, releases a constricting cord, and thus secures the tail of the net against collecting during its ascent.

Before daylight on the 19th there were few idle hands on the *Oceana*, since the heavy spar from which the hauling-gear was to run had to be hoisted and secured in the fore-rigging, and a slighter spar aft for the Silvertown sounder. Tearaght Light was still burning when, at 7.20 a.m., the *Oceana* took her departure due west from this point, and at 10 a.m. was in lat. 52° 4′·5 N., long. 11° 21′ W., the estimated position here of the 100-fathom line. The sounding gave 89 fathoms, with a fine sand bottom, and immediately it was obtained, hauls of the open nets were taken at the surface, 20, 50, and 75 fathoms. Proceeding along the same parallel, at 3.30 p.m. the *Oceana* was in long. 12° 27′ W., and the sounding gave 453 fathoms (sand and mud). The serial open nets were again used at various depths, and when they were hauled in, the Tanner net was sent down at 7 p.m.

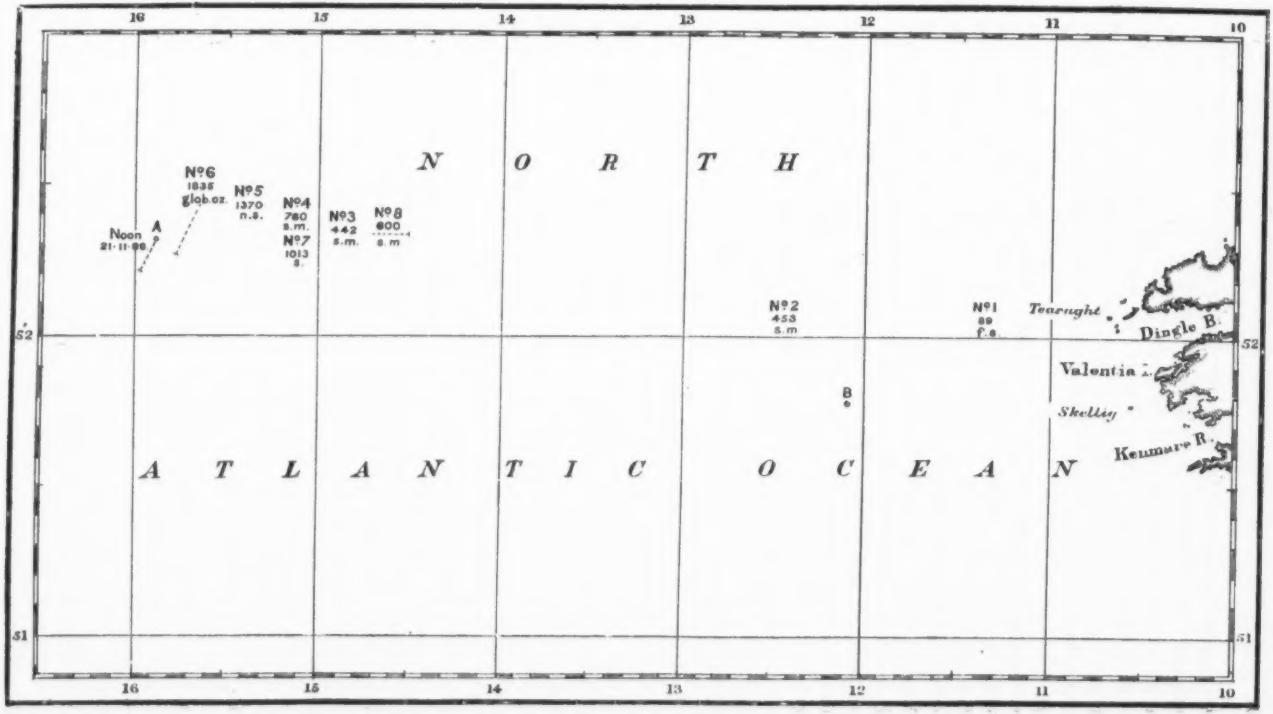
The stranded-wire rope used for tow-netting passed from its storage drum to a hauling-drum attached to the steam-windlass of the *Oceana*, and thence over a block depending from indiarubber accumulators of the Admiralty pattern on the end of the heavy spar. The behaviour of the accumulators was now watched with interest, and though they perceptibly stretched, and during later and deeper hauls stretched considerably, there was never at any time the least evidence of any elastic play; in short, there was never the least sign of their being of the smallest use, though at the last a heavy sea was running, and at no time was it other than a fairly heavy swell. This result was attributable to the great elasticity of the stranded-wire rope, which distributed throughout its length the strain of the up-and-down movement of the ship. The lesson to be learnt from this clearly shows the advisability in future operations of using a rope of this elastic character, the breaking strain of which must not be too much in excess of the actual strain employed. Under these circumstances, as in the present case, accumulators are unnecessary, and it is plainly better to have the strain thus distributed than to trust to the best accumulators, in which there must always be a certain amount of jerking. In all these deep hauls not a single net was lost by the heaving of the ship, even in the last haul during a heavy westerly gale. Owing to the smallness of the block on the accumulators, the manila rope could not pass, and the deepest

hauls were taken over an "old man" block, without accumulators at the deepest and most critical part of the operation.

The soundings, taken aft, were all hove in by hand, the members of the expedition taking turns in pairs at heaving in. A ludicrous mistake attended the first sounding in 89 fathoms. It was hove in by Mr. Murray and Captain Rickman of the *Oceana*. Their exhausted condition filled the others with dismay at the prospect of doing their share of a 2000-fathom sounding, but this feeling gave way to others when it was discovered that they had done their work with the brake down!

The Tanner net having been got in, it was discovered that, though the messenger had released the closing-cord, this cord had hitched over one of the clamps of the lock and so kept the net open. One of the troubles of this net, viz. that on lowering it *down an incline*, the hook would almost certainly release the constricting cord before it had gone far, had always seemed to some critics an explanation of Prof. Agassiz's failure to catch anything with it—the basis of his argument. At the last moment before starting, Mr. Gray had, with his unfailing resource, suggested lashing the hook with fine copper wire, which should be severed by the heavy messenger at the critical moment, and it was found that this precaution had succeeded exactly as he foretold. At 10 p.m. the *Oceana* set on to run 100 knots west true.

On Sunday morning (November 20) at 3 a.m. the wind freshened and the sea increased, but the conditions of work were not rendered much the worse. At 7.35 a.m., having run 91 knots on a west true course, the *Oceana* stopped in lat. 52° 21′·9 N., long. 14° 52′ W., and then commenced the most arduous day's work during the expedition, continuing with few relaxations until 1 a.m. on Monday morning. It was expected that the *Oceana* was now well down the Atlantic slope, but the sounding gave only 442 fathoms, viz. 11 fathoms less than the last, 91 knots nearer the coast of Ireland. It seemed that she was here crossing a southern prolongation of the "Porcupine" bank. At 8 a.m. she again set on her westerly course, and at 9.30 sounded in 760 fathoms in lat. 52° 23′·8 N., long. 15° 7′·9 W. At 10 a.m. she set on again to run 10 knots on same course, and at 11.10 (lat. 52° 25′·7 N., long. 15° 23′·8 W.) sounded again. At 1370 fathoms the wire parted without reaching bottom, and carried away a Sigsbee sounder—the only instrument lost during the expedition by such an accident. After running the same course for another 10 knots, another sounding was taken in lat. 52° 27′·6 N., long. 15° 40′ W. at 0.55 p.m., and bottom was found at 1835 fathoms. It was a tough business getting all this wire (with the Sigsbee) in by hand, since only two men could haul at a time. The iron handle bore such striking traces of this effort in its twisted condition, that it was decided to preserve it, but its appearance so outraged the best professional feelings of an engineer of the *Oceana*, that he surreptitiously straightened it again. One hundred fathoms for each pair was hauling enough, and



SOUNDINGS IN THE NORTH ATLANTIC.

the combined muscle of the members of the expedition and the ship's company was not much more than sufficient for the work. The barometer was rising, and without cessation of work the operation of towing down to the greatest depth was commenced. All the wire rope, viz. 1500 fathoms, was paid out, and the end spliced on to a 2-inch manila rope, of which 500 fathoms was also paid out. This operation was conducted very slowly—more slowly than the risk of bursting the silk nets warranted—for the reason that it was desired to preserve the delicate organisms captured from the least risk of crushing. The last tow-net came in at 1 a.m. on Monday morning. The operation entirely justified Mr. Murray's preference for hauling in by night, since the luminosity of the nets far below the surface gave ample warning of their approach—a matter of importance when careful measures for immediate preservation of the contents have to be taken. Mr. Blackman, who took charge of the fixing and preservation of the material, and Dr. Gregory, who computed the positions of the nets and observed the amount of rope paid out and hauled in, undoubtedly slept soundly during the few hours that followed before the next observations. It was decided to remain in the same spot, as near as might be, and to repeat the observations.

The following morning was spent in an effort to do justice to the claims of the Tanner net. It was sent down to 650 fathoms, every conceivable precaution having been taken to ensure a successful haul. The apparatus acted as required; the messenger severed the wire lashing and released the constricting cord. The lower part of the net came up empty after prolonged towing, and with very few organisms in the upper part. It was impossible to resist the conclusion that there is something amiss in the balance of the net, which so tilts it as to seriously interfere with its catching powers. However, this may be a hasty conclusion, and farther experiments may possibly prove it to be wrong. Dr. Gregory and Mr. Fletcher spent the morning adjusting the Gray net. At 2 p.m. another deep haul was taken of the serial nets, tangles, and thermometers (Miller-Casella, Buchanan's pattern). This was completed in slightly better time, since all the attachments of lengths of manila rope had been made on the previous day. The haul was in all respects successful except as regards the tangles, which caught nothing. It was then determined to commence the return course, and next morning (lat. 52° 20′ N., long. 15° 7′·9 W.) a sounding was taken in 1013 fathoms, and after running 15 knots farther to the east, sounded again in 600 fathoms (same latitude, long. 14° 43′·1 W.). This sounding in 600 fathoms was nearer land than the sounding in 442 fathoms mentioned above. A haul of the serial nets was taken in this more shallow water, and experiments were also made with the Gray net, in which, most unfortunately, a delicate spring broke in the heavy sea then running, and it was impossible to do more than satisfy the

members of the expedition that in it, at all events, the right principle had been discovered for an instrument of this sort. The last nets were got in while a strong westerly gale was rising, and without mishap, by careful watching. This position was the one selected for lowering two large fish-traps, one to the bottom in 600 fathoms, and the other in 300 fathoms. Preparations had been completed for buoying them, and the disappointment of all became more and more acute as the gale increased and the barometer sank lower and lower. The *Oceana* was kept head to sea in the lingering hope that the weather might moderate.

It will give some idea of the weather met with here when it is stated that no great distance to the south the unfortunate Wilson-Furness liner, the *Londonian*, was lying, during this night, disabled by the same gale. Things grew worse instead of better, and finally Mr. Murray decided to run before the gale and abandon the fish-trap part of the programme.

There are two schools of tow-netters: the old-fashioned method, here employed, by which the nets are towed horizontally; and the new method, by which an opening and closing net is let down as vertically as may be, and hauled in open through a given vertical area and then closed. Both methods have their advantages and their disadvantages. It is objected to vertical fishing that only small quantities are obtained under ordinary circumstances; and it is objected to horizontal fishing that there is a difficulty in estimating the positions of the nets, though a similar objection applies in a less degree to so-called vertical fishing, which can never be truly vertical while ships drift down the wind and currents flow in the sea. Mr. Murray had convinced himself by experiments (under 100 fathoms), made from the *Garland* in ascertained depths and with ascertained lengths of rope, that much of the objection to horizontal fishing had no greater weight than belongs to armchair disputations on the subject. In the accompanying diagrams, giving the estimated positions of the nets in three typical tow-nettings during the *Oceana* expedition, the outcome is given of the working method employed in Dr. Gregory's calculations. His main difficulty was the serious one of the employment of both wire rope and manila rope—the resistance of the rope being greater than the opposing action of its weight, while the resistance of the wire is less than the influence of its weight. In working in these great depths, Mr. Murray never expected to do better than come within 100 fathoms of the actual position, however carefully and unceasingly the ship's drift be watched. No more eloquent testimony to Dr. Gregory's success in computing the lengths of rope to be paid out could be cited than the following incident. In one of the deepest hauls the lowest net was set to tow 10 fathoms from the bottom, with slender hopes, it must be admitted, of ever seeing it again. In the result this net came up with

a small quantity of ooze in it. It had not hit the bottom, or it would have been burst and had its rim indented, and yet it had come near enough to gather ooze, probably stirred by the 60-lb. sinker. This conclusively proves the accuracy of the curves, since had they been less sharp the lowest nets must have fouled the bottom, and had they been sharper the lowest net would not have reached this muddy zone. This almost incredible witness to the accuracy of Dr. Gregory's computation (made rapidly on deck when told the estimated drift) was received on board with a welcome exceeding even that natural to its being the last of a long spell of continuous work on a wintry day and night in the North Atlantic.

One small incident is worth recording. There was some curiosity to observe the action of great pressure on wood in a great depth, and it had been intended to lower a suitable piece. This was forgotten in the hurry of attending to more important things, until so much wire had been paid out that it was possible to experiment only with 500 fathoms. A piece of common deal matchboarding was sent down, and since it came up apparently unchanged, deep-sea pressures were openly derided by some of the more frivolous members of the expedition. On the following day, while pieces of wood were being thrown overboard to assist in estimating drift, this piece, which had been left on the deck, was thrown in its turn. It instantly sank.

Next day the wind slowly fell, but the sea still ran very high, and the barometer continued to sink. Towards evening it began to blow from the north-east, and soon it blew a whole gale from that quarter. Its action on the great waves still running up from the west was, while it lasted, most impressive. At 2 a.m. on Thursday morning it was decided to make Queenstown for shelter, and on arriving there the *Oceana* was detained for thirty-six hours. The weather then moderated sufficiently to permit of the return passage to Penarth.

It will take several months to complete the analysis of the contents of the tow-nets, and when this has been done, a report of the result will be communicated to the Society. In the mean time there is full confidence that the material obtained will permit of a decisive answer.

Where every one worked hard, with zeal and loyalty to the objects of the expedition, under circumstances in which overcrowding and squalor were tempered by long periods of exposure to very fresh air and water both separately and in combination, it may seem to others than the members of the expedition themselves invidious to mention the work of any one man. Captain Bates, at a few days' notice, joined as navigating officer. He had not the primary scientific incentive of the other members. Spurred only by a sense of duty and comradeship, he was not only navigating officer, but able seaman, mechanician, and standing example of the truth that when you want a thing well done, get a sailor-man to do it.

A JOURNEY TO NORTHERN TIBET AND AKSAI CHIN.*

By Captain H. H. P. DEASY.

STARTING from Khotan on May 18, 1898, I took the direct route to Polu *viâ* Utroki, Hasha, and Nura, in the hopes of getting fine weather, and being able to get a good value for my longitude by triangulating from two peaks, fixed by the Survey of India, in the Tekelik Tagh. For this purpose I halted for nine days close to the peaks I wanted to observe, but unfortunately the hazy season had commenced, and I was unable to see either peak.

The Bey of Polu having informed me that the direct route to the Aksai Chin *viâ* the At To (horse's back) pass, called Ghubolik At pass on the R.G.S. map of Tibet, is closed to all, natives of Chinese Turkestan included, since the murder of Dutreuil de Rhins many hundreds of miles away, I wrote to the Amban of Keria for permission to use that route, as my passport covers the Aksai Chin, and, pending a reply, camped on the high plateau close to, and about 2000 feet above, Polu, in hopes of getting a fine view of the Kuen Lun range. There I was again unfortunate, and during the fortnight that I was obliged to spend at Polu and its vicinity, only on one day, and then merely for a few hours, were the fine snow-peaks of the Kuen Lun range clearly visible. The Amban of Keria, who several times informed me that the Aksai Chin is part of the province of Sin-chiang and under his jurisdiction, refused to allow me to use the Polu route, and would not permit me to obtain sufficient supplies at Polu. Being short of transport, owing to the sheep not having arrived from Tadakh, I was forced to go to Keria to obtain more transport, and again asked for permission to travel *viâ* Polu to the Aksai Chin, but was again refused. As my passport, which was shown to the Amban of Keria, includes the whole of Chinese Turkestan, I fail to see any reason for that official ignoring it and refusing to allow me to use the direct route to that part of his district, causing me considerable delay and inconvenience, not to say extra expense, by forcing me to take the lengthy route *viâ* Sorgak, Kara Sai, and Tibet.

From Kara Sai the ascent to the Tibetan plateau is very easy, being for most of the way up the gently sloping valley of the Tolan Khoja river. To about halfway up this valley there is plenty of excellent grass, but for the latter part it was necessary to supplement the scanty supply of burtza with bhusa. The pass at the head of this valley is a very easy one, and from a little way south-west of it, the Shor Kul depression and adjacent mountains are plainly visible; but, alas! the country thereabouts is barren and waterless, with the exception of close to Shor Kul, where there is a fair amount of coarse grass called lungma

* Dated "Yarkand, October 31, 1898."

by Ladakis and Tibetans, and but very scanty supply of fresh water, Shor Kul being a salt lake.

The general run of the Kuen Lun range for some distance west of Polu is along lat. 36° N., but a little way east of that village it is several miles north of that parallel, continuing slightly north of east to the Tolan Khoja river. East of this river there are no snow-peaks, at least for some distance east of Kara Sai, the range rapidly becoming lower; and only very low grass-covered hills have to be crossed between that place and the long valley of the Tolan Khoja river. Part of this valley as far as Yaluk is called Tolan Khoja, and above this place Sarok Tuz (yellow salt). Having been told by the men of a temporary post that the Amban of Keria had established at Yaluk, in the Tolan Khoja valley,—nominally for the purpose of rendering me assistance and providing supplies, but really merely for show,—that there is a southerly route from there to Ladak, I went some distance up the most likely looking valley in search of it; but I was forced to return, as the valley became too narrow and rocky for laden animals, while not a blade of grass was to be found in it, and the very high barren mountains, with almost vertical sides, limited the view to a few hundred yards towards the mouth, and considerably less higher up. Repeated attempts were made to find a route other than that by Shor Kul, but the utterly barren nature of the country certainly as far south as lat. 35° 30′ N., and the great probability that it is waterless too, constituted a strong natural barrier which I did not consider it advisable to try and pass. There were many natives with me only too eager to earn the rewards I offered if another route was found, but all declared the country to be barren and waterless, and from what I saw of it I can corroborate their statements.

For some weeks after leaving Kara Sai the weather was exceedingly bad, snow falling continually in July, and I was unable to take observations for some time, or to see any distant peaks. Besides this cause of delay, illness was another, dysentery, chest, and liver diseases being the principal ones I was called upon to treat. While I went west from Yepal Ungur, on the Keria river, three exploring parties were sent out to try and find routes in any direction between east and south. But though the men were warned not to, on any account, go north of the rising sun, two of them went much too far to the north of east, while the third party, Kara Sai men, speedily returned, their excuse being that they did not think any one else had been before them, an excuse which they did not appear to be in the least ashamed of giving.

Thinking that from the peaks near Aksu, on the west branch of the Keria river, some of those in the Kuen Lun range or in the west of the Aksai Chin, which had been fixed by the Survey of India, would be visible, I began triangulation there, and thence worked backwards to south of the Shor Kul, only to find but the scantiest supply of burtza.

Compelled to retreat from this part, I tried a route which one of my men assured me was feasible, and led to a lake he remembered having gone to with Pike and me in 1896. This, however, proved to be worse than the first, as after a few miles east of my most easterly camp, approximate long. 82° 35′ E., not even burtza grew, while for fully two marches south there was not a vestige of any kind of vegetation to be seen; so I returned once more to Yepal Ungur, on the Keria river.

This river has four principal tributaries—the two westerly ones, that by Aksu, and another east of that place being larger than the easterly ones, except that nearest to Yepal Ungur, which for a short time in the summer is fed by the melting snow on the very high range on the right bank of the Keria river. This extensive range of snow-capped mountains, in which there are some magnificent peaks rising to fully 23,000 feet, extends from about long. 82° 30′ E. to 81° 30′ E., and there becomes lower and lower, gradually dying away west of Yeshil Kul. The range on the opposite side of the valley of the Keria river does not boast of more than a couple of snow-peaks until Iksu is reached, west of which every peak is covered with snow, and all the valleys filled with glaciers.

Not far distant from the pass north of Togral Onpo is a singularly extensive and rounded snow-capped mountain, to which Pike and I gave the name "Mount Cumulus," owing to having mistaken it in 1896 for a cloud of that name, when first seen from near Horpa or Gurmen Cho. At this point the range changes direction, its general direction being now almost due west as far as 81°, where there is a very fine double peak, the most westerly point being 23,490 feet high.

After leaving the valley of the Keria river, I went *viâ* the north side of Yeshil Kul to camp 15 of 1896, for the purpose of extending the triangulation done in 1896 eastwards and northwards. This place not admitting of sufficiently long bases in the required direction, I moved camp a short distance in an easterly direction, and measured bases of over 7 miles in length. Favoured by fine but very windy weather at this camp, I obtained most extensive views in all directions, including the high snow-range south of Horpa Cho, that on the right bank of the Keria river, and that in the middle of the Aksai Chin. By about 11 a.m. each day at this camp, the prevailing westerly wind became so strong that it was necessary to securely tie the legs of the theodolite to heavy stones to prevent it being blown over, which made the task of observing and recording by no means a pleasant one. Having accomplished my task, I returned to Baba Hatun, and connected the triangulation done previously at Aksu and elsewhere with that of 1896.

Within a few hundred yards of my camp at Aksu, the Amban of Keria established a temporary post, apparently for the purpose of making it plain to me that the Aksai Chin, at least the part I was in, was under his jurisdiction. The season was now well advanced, the minimum thermometer having fallen to −9° Fahr. during the night of

September 20; the solar radiation thermometer, black bulb, registered 106° the following day at the same place, and as the supply of grain was now very low, I turned west to Ulugh Kul. After crossing a low and very easy pass a few miles south of this salt lake, I came to the upper waters and sources of the Khotan Daria, the latter being in lat. 35° 35′ N. and approximate long. 81° 40′ E.

The first intimation I had of the proximity to Ulugh Kul of the sources of this river was from two shikaris who had just returned from the Khotan river, where they go annually in search of yak. This was corroborated by two other shikaris whom my caravan bashi met close to it. The latter party stated that they are well acquainted with the upper waters of this river, and informed the bashi that, owing to the narrow and deep nature of the valley about half a march west of where I camped, it is not possible to take a caravan down it, to where there are two or three places frequented every summer by those who earn a poor existence by digging for gold.

My supplies not admitting of my testing the statement as to the impracticability of the Khotan Daria valley, I returned to Ulugh Kul, and thence along the south of the lake, and two other small lakes, to At To (horse's back) pass, at the top of the Polu gorge. Being anxious to endeavour to carry on triangulation to Polu, I halted close to the summit of this pass for a day in quite the most dreary place that fate has compelled me to camp in. Not a vestige of vegetation is to be found within several miles of this inhospitable spot, and not even enough dung to boil a cupful of water; but fortunately the water-supply was just sufficient. A few donkey-loads of bhusa and a little corn brought from Polu enabled me to keep the few animals requisite for carrying the tents, instruments, etc., till the work was finished.

I fear that the time spent close to the At To pass was time wasted, as, owing to the very steep and narrow nature of the valley north of this pass, and its precipitous sides, there is but a very poor chance of seeing from the plateau above Polu, any of the peaks observed from near the At To pass. Unfortunately, the weather changed the day after Polu was reached, and it was not possible, except for a few hours, to see the fine peaks, now quite white, of the Kuen Lun range. The most striking meteorological circumstances were the absence of any very strong or prevailing wind north of the very high range on the right bank of the Keria river, and the registering of 20° of frost on the night of July 25. The great scarcity of game and the ample evidence forthcoming as to the roving habits of the yak were very noticeable, but I must confess to a considerable amount of surprise at seeing a yak approach my camp near the At To pass, miles away from all vegetation.

A noteworthy feature was the discovery of a large and deep—at least 12 feet—bed of dried weeds, similar to those found round some of the lakes visited by Pike and myself in 1896, at an approximate

altitude of about 17,500 feet, far away from any lake or trace of one, and on the low hills of the left bank of the Keria river.

The topographical work was done by a sub-surveyor of the Survey of India, under my supervision.

SVEN HEDIN AND DUTREUIL DE RHINS IN CENTRAL ASIA.*

By Colonel Sir T. H. HOLDICH, K.C.I.E., C.B., R.E.

Among late works of travel, Dr. Sven Hedin's book stands pre-eminent as an exposition of scientific geography. Never was a book of this sort so welcome as at present. We have had more than enough lately of geography which is not scientific, and of popular works of travel which have added no really valuable addition to our map information; neither have they assisted to unravel any of the ethnographical riddles with which Asia and Africa abound. The unexplored spaces in High Asia are narrowing year by year, and with so much good geographical material as exists already, we want more exact information and more accurate observation to improve the old work, and fill in the new. In traversing Central Asia Sven Hedin departed from the usual Asiatic programme of exploration, and did not make Lhasa an objective. That city, which is still enveloped in a halo of most undeserved romance, has been visited often enough by Europeans to destroy the illusions which are usually draped around it, and, although there is certainly much yet to be learned about its quaint political institutions and weird customs, our knowledge can hardly be improved by any process short of actual residence within its walls; and of this there seems little chance at present. Lhasa was visited early in the last century by Desideri, who lived in the city for thirteen years; and by Della Peuna, who was for some time there with Desideri. Then followed the Dutchman Van der Putte, who was so afraid of the reception that his Lhasa records might receive in Europe, that he destroyed them. In 1811, Mannering was sent on a political and commercial mission from India; and in 1845 the two devoted Jesuit missionaries, Huc and Gabet, were well received there. For more than fifty years no European has seen the inside of that city, although the native employés of the Indian Survey, the Pundit Nain Sing, Krishna, and the Lama Unguen (who accompanied Chandra Das) have all contributed to give us a fairly accurate account of it. Such persevering travellers as Bower, Littledale, and Bonvalot have all been refused admission, even to the neighbourhood of the sacred city; and now we have Grenard's story of De Rhins' failure. Sven Hedin wisely avoided Lhasa, and devoted his remarkable energies to investigating the phenomena which surround the natural features

* 'Through Asia,' by Sven Hedin. 2 vols. Methuen.—'Dutreuil de Rhins, Mission Scientifique dans la Haute Asie, 1890-95.' 2 vols. Paris: Leroux.

of Central Asian geography, dividing his explorations between the elevated tableland which lies between the Kuen Luen mountains and the Himalaya, and the great central depression which forms the Tarim basin. Unlike the majority of explorers, Sven Hedin spent several years in the attentive study of the works of preceding travellers, and even took a trial trip in order to determine the best methods of proceeding. Backed by the cordial support of the King of Sweden, well supplied with funds, possessing a remarkable faculty for picking up new languages as well as for expressing himself in old ones; gifted with the eye of an artist, and the constitution of an athlete, and blessed, moreover, with that happy spirit of universal good fellowship which makes a man equally welcome in the court or the camp, it is, after all, small wonder that he succeeded in penetrating to regions untraversed before, and that he has unearthed the long-buried secrets of a forgotten phase of Asiatic civilization.

In April, 1894, Sven Hedin left the Russian outpost of Fort Pamir, on the Murghab river, and by the middle of the month found himself at the foot of the Mustagh Ata—a mountain which dominates that meridional chain which we now call the Kashgar range, running parallel to, and east of, the great Sarikol watershed which divides the drainage of the Oxus from that of the Lob Nor lake regions. There has always been a peculiar fascination about the great "Ice father," the Mustagh Ata. It claims to be the highest mountain existing north of the Himalaya; it was observed by Trotter, who accompanied the Forsyth mission to Yarkand, and its height determined from trigonometrical deductions to be 25,300 feet. Trotter named the peak Tagharma, from the plain at its foot, which is called by that name. There is, however, some doubt surrounding Trotter's determinations, from the fact that another high peak to the north of Mustagh Ata would almost certainly interfere with observations taken so far to the north-east as his base near Kashgar, and consequently it is not safe to assume that there is any peak in the range so high as 25,000 feet. At any rate, Sven Hedin's Mustagh Ata is an unmistakable feature when observed from the south-west. Its magnificent dome-shaped crest and flanking pinnacles identify it beyond possibility of error, and its position has been fixed now in direct connection with the Indian triangulation. Its height was determined by Colonel Wahab (working with the Pamir Boundary Commission) at 23,500 feet. This is, however, quite high enough. There is no really satisfactory record of any traveller ever reaching so great a height. It is not surprising that in April Sven Hedin failed in his "intention to climb to the summit of the mountain, examine its geological structure, its coat of ice mail, and the gigantic glaciers which plough their slow way down its rugged side," and that he was temporarily "compelled to return, with strength broken and eyes bandaged, to seek a warmer climate." But he returned

to the attack in August, and during a second and third attempt he carried out at least the best part of his programme. He did not reach the summit, but he has added a store of information about the construction and movement of the Mustagh Ata glaciers which cannot fail to be of great scientific value. And we may draw attention, not only to the minute and painstaking accuracy of his observations, but to the completeness of his series of illustrations. They are clever, artistic, and admirably clear.

Then followed his adventurous journey across the desert between the Yarkand and the Khotan darya—the two great affluents of the Tarim river, which loses itself in Lob Nor; and this part of his story contains a moral. It is a good illustration of the terrible misadventures which may befall even the most careful traveller who trusts to *conjectural maps and native information*. No sensational travelling tale that ever was written can exceed the absorbing interest of this narrative of a fight against the forces of nature—sand-hills and sand-storms, and the agonies of thirst. Sven Hedin lost two of his scanty following in the desert, and he would probably have lost a third, had he not been able to reach water himself, and carry a supply back in his boots for the relief of his last attendant. He lost camels and instruments, but his records were preserved by a second faithful follower, who finally struggled into safety; and there is nothing more remarkable in the book than the care with which the daily narrative of that ghastly period was sustained throughout—up to the very last day of it.

But the most interesting, as well as the most valuable, result of Sven Hedin's explorations was the discovery of two sand-buried cities in the Takla Makan desert. The movement of the enormous sand-dunes, or sand-waves, across open desert spaces which are subject to the terrific violence of periodic wind-storms, may not inaptly be compared to that of the sea, though the actual wave-motion is, of course, very dissimilar. Successive billows and troughs are formed, which are subject to perpetual change under the influence of wind. The gradual process of sand encroachment can be observed in the Takla Makan desert (as in the Oxus regions) by the desiccated remains of forest and vegetation in the neighbourhood of rivers. The rivers themselves are gradually being pushed eastwards, and the riverain tracts become slowly enveloped. Towns and cities which were once within reach of irrigation are lost in the sand encroachment, and as the successive waves traverse their sites they are occasionally brought to light in the troughs of the sand ocean, again to be overwhelmed by the next following wave. Sven Hedin was fortunate enough to light on two cities thus exposed to view; and nothing can be more interesting than his description of the relics which he rescued from them, which point conclusively to the existence of these cities as great Buddhist centres in ancient times. The more recent of them, which is about 120 miles north-east of Khotan, and (apparently)

not 20 miles from the southern edge of the desert, may have existed when the Chinese pilgrims of the early centuries of our era made their religious pilgrimages through Asia. Sven Hedin thinks that Takla may be the Tu-ho-lo of the Chinese, and that the Tukhari inhabitants were a people (possibly of Tibetan origin) who migrated westward, and founded the kingdom of Tokharistan. His observations of the direction and nature of the sand encroachments that are gradually drifting to the south-west, lead him to assign a period of about two thousand years from the time of the cities' disappearance to the present limits of desert formation. The Buddhist figures and paintings which he recovered in a marvellous state of preservation, do not differ materially from those which are found in the Peshawur valley, and which belong to a period anterior to the ruthless invasions of Mahmud of Ghazni. Greek influence in design is very perceptible in all of them.

The second city, which he unearthed when following the course of the Keria river, appears to be of about the same date, though very much farther removed from the southern edge of the desert. All this part of Asia was so devastated by the Arabs in the early part of the eighth century, when the faith of Islam was forced on the population, and subsequently so cruelly given over to destruction by Chenghiz Khan in the early part of the tenth century, that it is not likely that anything in the shape of ancient building structure will ever be found to connect the modern city of Khotan with the buried city of the desert. The site of Khotan is probably as ancient as any of them, but the city itself is modern. Sven Hedin secured an interesting relic of certain ancient Christian communities at Khotan, which must have been directly connected with the Nestorian and Jacobite sects whom Marco Polo mentions as existing at Yarkand and Kashgar. As early as the fifth and sixth centuries A.D., there were Christian bishoprics at Herat, Merve, and Samarkand, later at Yarkand, and finally in China. That at Yarkand is believed to have existed in the fourteenth century. The last Gurkhan of the Kara Kitay empire, the legendary Prester John, was a member of a Christian Kirghiz tribe called Naiman, which tribe is well known on the Pamirs to this day. Chenghiz Khan himself, though he hunted down and destroyed Prester John, is said to have married a Christian wife. Survivals of ancient Christian ritual are still to be found amongst the Sarikolis and certain Kirghiz tribes, especially in connection with their marriage customs.*

Sven Hedin's mapping of Lob Nor, the terminal lake region of the Tarim river system, is one of the most valuable of modern additions to the geography of Central Asia. He shows conclusively that this is a region of perpetual change, and that there have been extensive modifications of the lake outline even since the days of Prjevalsky. On the

* *Vide* 'Pamir Boundary Commission Report.'

whole he finds the lake system (for there are many lakes) to be very much where Chinese geographers place it. The altitude of this central depression he marks as only 2500 feet above sea-level.

Through the waste, uninhabited regions of Northern Tibet, amongst wild yaks and "kulans" and uncouth Mongolian nomads, Sven Hedin's story takes the reader to China. From his start at Keria, south of the Takla Makan desert, past the great blue lake of Koko Nor, to his first European greeting with the young American lady doctor in Chinese dress and spectacles, who welcomed him at Tenkar, the whole story is fascinating—but we cannot follow it further. Dr. Sven Hedin sums up the extent of his travels as covering a distance rather more than from the north to the south pole. When we think of the wealth of minute scientific observation that was acquired during that extent of travel, and note the traveller's keen interest in the ever-varying phenomena of nature, as well as in the idiosyncrasies of the uncultivated humanity that he met with on his way, we cannot feel surprised that two fairly large volumes should fail to complete his record, and that we must look for a further instalment of scientific notes to round off the full results of his monumental expedition.

M. Dutreuil de Rhins commenced his explorations in Central Asia by adopting Khotan as a base, similarly to Sven Hedin, whom he preceded. The year 1891 was occupied in a tour to the south-east, when he visited Polour (Polu of Sven Hedin's map), and traced the course of the upper Keria, through the deep gorges which carry it from Polu to the plains. He visited Nia (described by Sven Hedin), and returned to winter at Khotan.

In 1892 he again traversed the road to Polu, followed up the Keria river to its source, and then struck south-west by Yeshil Kul into the lake region to the north-east of Ladak. The difficulties and hardships of travel in the mountain regions south of Polu told so severely upon his health, that it is hard to understand, from M. Grenard's description, how it was possible for him to proceed at all. Proceed he did, however, and after traversing an almost unknown region east of Ladak, he finally reached Leh, from whence he followed the Karakorum route back to Yarkand. Although he was working in regions not very remote from Indian survey, he was on comparatively new ground, and this expedition should add much to our topography of Western Tibet, although not much is perceptible in the very small-scale maps which illustrate the book.

Want of resources, combined with ill health, had so far prevented De Rhins from carrying out the full programme which he had laid down for himself at starting. But he was in no ways discouraged, and he succeeded in obtaining more substantial support for his next attempt at traversing Tibet in 1893. It is interesting to observe that about this period the author of the book encountered an old Chinese friend,

one T'ien, at Yangi Hissar. T'ien had been decorated with the "blue button" for the success of his negotiations with "Colonel Mortimer Durand" at Gilgit, and claimed to have obtained great concessions for China. Final arrangements for further exploration were not complete till July, at Cherchen, whence De Rhins and Grenard made their start southward for Lhasa.

From Cherchen they followed a route, which carried them to the head of the Kara Muren river, the upper branches of which are shown by their maps to be considerably south of the position assigned to them by Sven Hedin. In September they crossed the Arka Tagh by a pass about 60 miles west of Sven Hedin's, and apparently much easier. The head of the Kara Muren leads directly to it. As they had sixty-one baggage animals with them, including camels, it must be, for Tibet, a comparatively easy pass. From the Arka Tagh they travelled almost due south through an absolutely unmapped and unexplored region, until they struck Bower's route to Lhasa in about lat. 33° N. So far they had traversed an elevated lake region with all the dreary characteristics of the uninhabited wastes of High Tibet, crossing the general strike of the plateau ranges, and discovering many small lakes, of which they counted sixteen before turning eastward. This eastward turn was taken from lake 16 (which is one of those mapped by Bower), and it carried them, during the month of November, in an east-south-east direction past four great lakes before reaching the Namtso, or Tengri Nor. Bower's route lay to the north of these lakes, touching their northern shores. De Rhins passed them on the south. From Gyaringtso to Tengri Nor they were approximately on Littledale's route, but they formed their final camp for entering into negotiations with the Lhasa authorities at the eastern end of the lake. Littledale penetrated further, and reached the watershed between the Tengri Nor and the Sangpo (the river of Lhasa) from the western side. There is, however, not much to choose between them. They were equally unsuccessful in overcoming the prejudices of the Tibetan authorities, and, although negotiations appear to have been conducted courteously and in a friendly spirit, there was finally no alternative for the French explorers but to take a northerly route again to the Chinese border, and to leave Lhasa unvisited. Half of the baggage animals had been lost in the journey to Tengri Nor, and it was necessary to refit before starting, so that it was not till January that they were again on the road. The Chinese frontier town of Sining had now become their objective, and between it and Lhasa is a much-traversed and well-known trade route. But a route which had already been exploited by several travellers did not meet De Rhins' approval, and he decided on following the road which leads *viâ* Nagchu to Gye-rgoundo (Jyekundo) to Sining. Having first established connection with Bonvalot's routes at Larkang, south-east of Tengri Nor, the two

Frenchmen quitted their camp at Zamna (? Dakmar) on January 19, for Nagchu.

From Nagchu the road to Jyekundo diverts eastwards from the regular Sining trade route, and passes through a mountainous country which encloses the headwaters and sources of the Mekong and Dichu, or Yangtse Kiang. It was not till the end of May that they reached Gye-rgoun-do (the English spelling of which is Jyekundo), and here they met with a very doubtful reception. In fact, there were unmistakable signs of hostility on the part of the authorities. Two marches from this place, along an unfrequented route, for which no guide was forthcoming, De Rhins met his fate. They had reached a village called Tong-bou-mdo (English spelling, Tambudia), and experienced an openly hostile reception on the part of the people. It was unfortunate that at such a juncture De Rhins should have been led into an act of retaliation for the loss of two of his baggage-ponies, which were stolen during the night. He seized the first two that came to hand, and impressed them into his service. Possibly the effects of hard work and exposure in a frame already much enfeebled by pain and sickness had told upon him, and dimmed his perceptions of the urgent necessity for that "equal mind" which Horace tells us we should be specially mindful to preserve in face of adversity; for we read previously, that at Jyekundo he had threatened to pull the ears of the chief official in the town if his wishes and demands were not complied with. Anyhow, the end soon came. The caravan was attacked, and De Rhins was mortally wounded by a Tibetan bullet before they had proceeded far from the village. There can be little doubt, from M. Grenard's account, that the attack was organized by the village authorities, and countenanced by the officials at Jyekundo. After De Rhins fell, the party was broken up and scattered, and it appears that De Rhins, alive or dead, was thrown into a small affluent of the Dichu river. M. Grenard escaped with difficulty into Chinese territory. This happened in June, 1894, and the news reached Sven Hedin the following January. On arrival at Sining, Sven Hedin was shown, amongst other curiosities, the skull of De Rhins' murderer, but it must be extremely doubtful if the individual who fired the fatal shot was ever identified.

The most important of the geographical results of the journeys of this adventurous Frenchman is the new light thrown on the physiography of the elevated lacustrine regions of Tibet to the north-east of Ladak. We have now three routes traversing the high mountainous tableland which lies south of the central depressions of the Tarim basin, from north to south. De Rhins, Littledale, and Bonvalot have all crossed that plateau on lines which are approximately parallel; and, thanks to Sven Hedin's observations, and the care taken by M. Grenard to bring De Rhins' route to a connection with that of Bonvalot, we shall probably have a better basis for reconstructing the general map of that

part of Tibet that we have ever yet possessed. The maps illustrative of M. Grenard's book are on far too small a scale to admit of any comparative method of testing the results of his work. It would appear, however, that the greatest difference shown in absolute position of any point, between his mapping and Sven Hedin's, is at the starting-point, Cherchen, where there is an apparent difference of some 8 or 10 miles in longitude. His position of the great chain of lakes north-west of Lhasa seems to accord fairly well with Bower's; and he has illustrated the geography of the country immediately to the north-east of Tengri Nor in a manner which no previous traveller has attempted. The final results of his map compilation cannot fail to be very valuable. The book is written in a style which renders every page of it interesting. Too often the deadly monotony of Tibetan travel is reflected more or less in the pages of the travellers who tell the tale of it. This is not the case with M. Grenard's story; and the illustrations of the work (especially the reproduction of photographs) are as perfect as only French artists can make them.

VOYAGES OF THE ZENI.*

By C. RAYMOND BEAZLEY, M.A.

This book (in writing which Mr. Lucas has enjoyed the valuable advice of Mr. C. H. Coote and Mr. Miller Christy) is unquestionably and by far the best study of the Zeno question that has yet appeared. At the same time it must not be forgotten that Dr. Gustav Storm is the Continental protagonist of the critical indictment against the Zeno stories, and that the case, which may now be considered triumphant, was first presented by that eminent Norse scholar in his 'Om Zeniernes Reiser' and 'Claudius Clavus' (1891). Admiral Zarhtmann, indeed, had, as early as 1833, subjected the Zeno narrative to a very disquieting examination in his 'Bemærkninger om de Venezianerne Zeni'; but Major in 1873 ('Voyages of the Zeni'), Desimoni in 1878 and 1885 ('Memoria interno ai viaggi dei ratelli Zeno' and 'Viaggie carta dei fratelli Zeno'), with others, made a brave attempt to rehabilitate the disputed tradition, and for some time arrested its decay. Thus John Fiske, as late as 1892, considered that Major's "heavy strokes" had so "completely demolished" Zarhtmann's objections that not enough was left to pick up ('Discovery of America,' vol. i. p. 237). Fiske had not read Storm's already published studies, or he would not have committed himself to this unfortunate piece of rhetoric, or to the still more unlucky outburst that follows ("as

* 'The Annals of the Voyages of the brothers Nicolo and Antonio Zeno in the North Atlantic about the end of the fourteenth century, and the claim founded thereon to a Venetian discovery of America: A criticism and an indictment.' By F. W. Lucas. London: Henry Stevens, Son, & Stiles. 1898.

to this . . . we may . . . safely cry, *Finis, laus Deo*"), for in 1891 matters were already desperate with the Zeno story as a whole. The more important features of Dr. Storm's work are now represented to the English reader by this splendid volume of Mr. Lucas; but the latter's work is far more than a reproduction of any earlier book on this subject. The Zeno controversy was never before presented in so ample a manner, and with so many and pertinent illustrations.

The present indictment falls into five parts: (1) The story of the book related, pp. 1–56; (2) the story of the book considered, pp. 57–139; (3) summary and conclusions, pp. 143–157; (4) appendices and index; (5) atlas of maps. Among the appendices we have, *e.g.*, facsimiles of the Zeno narrative from the original edition of 1558, and from Hakluyt's 'Divers Voyages' of 1582; a comparison of the names on the Zeno map with their correspondencies on fifteen other cartographical works, from the Bianco of 1448 to Ruscelli's 'Ptolemy' of 1561; a table of Zenian identifications by the leading defenders of Zenian genuineness, in whole or part, from Reinhold Forster to Steenstrup (1784–1884); and a chronological list of the principal authorities. Among the maps are portions of Fra Mauro (1457–9), the Zamoiski map of circa 1467, the Olaus Magnus of 1539, the Mercator of 1554 and 1569, the Tramezini map of 1558, the Lafreri of the same year, the Ruscelli edition of Ptolemy (1561), and the Ortelius of 1570. The original Zeno map occurs at Plate XI. in this atlas, which is supplemented by several important illustrations in the body of the text. This volume, it must be said, is a credit, not only to Mr. Lucas, but to the Chiswick Press, and is one of the handsomest geographical books published recently.

Assuming that Mr. Lucas's general conclusions are, with our present lights, final, it may perhaps be thought that a little more allowance should have been made for a possible basis of fact in the European part of the narrative. All pretensions to an American discovery are, as suggested here, quite untenable; but it may be fair to enlarge slightly the first conclusion on p. 156, and to say, not only that Nicolo and Antonio Zeno "may have" sailed into the North sea, visited the continental Frisland, and written letters to Venice during their travels, but that they probably did so; that such letters may have survived into the sixteenth century; and that these may have been used in the compilation of the 'Annals.' It may also be thought that in Zeno's Frisland there is a genuine reminiscence of Iceland, and of Shetland in his "Estlanda," and that the travellers Nicolo and Antonio did really voyage to these islands, as well as the Färoes, in the last years of the fourteenth century. A little more also might have been made of some of the excuses well stated on pp. 144, 145, *e.g.* that the errors of the text are partly due to the misreadings of the compiler, and that, mixed with exaggeration and falsehood, there are many things in the story which are true in themselves, though distorted by the ignorance of the historian.

A certain ruthlessness of temper appears at times to drive Mr. Lucas, as it drives Mr. Harrisse, into a more absolute denial than is necessary or advisable; but for this such a defence as Major's is largely responsible. The last-named scholar rendered great services to geography in his time, and can never be mentioned except with respect; but in the Zeno controversy his almost aggressive attitude of belief was quite out of place. He also made several mistakes in detail, which are difficult to understand, and which are noticed, perhaps with somewhat too severe a pen, by Mr. Lucas. He repudiates, as an insinuation against "Zeno's excellent Greenlandic geography," Zarhtmann's suggestion that the (then lost) Olaus Magnus of 1539 might have served as a basis for the Zeno map. This and similar dogmatism against Zarhtmann's "old manuscript map" at Copenhagen broke down completely with the re-discovery of the very Olaus in question (1886) of the Zamoiski map (1888), and of the three "Florentine" designs reproduced by Nordenskjöld in his 'Bidrag till Nordens . . . Kartographie' (1892). The important correction of the date from 1380 to 1390 Major wrongly attributes to Hakluyt, who was only following Ortelius. The name identifications given in certain places by Zeno's apologist are greatly ridiculed—often with reason—by Mr. Lucas (pp. 69, 70); but some of them are matters of opinion, and perhaps not so impossible. Corruptions almost equal to those of the Zenian nomenclature are surely to be found in some genuine records. On pp. 68, 70, 73, 87, 90, 94, 95, 97, 99, 119, Mr. Lucas gives other and better instances of Major at fault, but they need not be noticed here, except his extraordinary inconsistency as to "Icaria," Kerry, and Ireland (p. 70, note, etc.).

Past methods of Zenian apologists are therefore, no doubt, responsible for the occasional hardness of Mr. Lucas's indictment. Otherwise, he would perhaps have more freely admitted (pp. 4, 5) that the genuine Persian travels of Caterino Zeno, which accompany the northern travels of Nicolo and Antonio, and like them have lost their original documents, give some colour to the latter, and suggest that even these contain a residuum of truth, however much compromised by "American pretensions" without any support in fact. On pp. 46 and 61 of the present volume, rather too much seems made of the destruction of the date-coincidence argument bearing upon the identification of "Sinclair" and "Zichmni," unless it is implied that Sinclair was no longer living in 1390, at the real time of Nicolo Zeno's first visit. Also (on p. 73) the words "ignorance or impudence" seem excessive for a merely conjectural liberty of Nicolo the younger; the same may be said of the term "apocryphal" (p. 68) for Ferdinand Columbus 'Historie' or 'Life of the Admiral,' whose genuineness can hardly be considered as in all respects disproved. Harrisse himself does not, Mr. Lucas admits, absolutely reject the very passage as to "Frisland" which is responsible for the word "apocryphal" in this connection.

The canon suggested, on pp. 87, 88, viz. that "one piece of fable" can taint a whole story with suspicion, is one that occasionally leads to over-criticism; the literature of Sebastian Cabot and Ferdinand Mendez Pinto is evidence of this, and Mr. Lucas perhaps overstates the gullability of the reading public. The wish to give even the strangest stories a fair hearing is not to be confounded with mere credulity; and the advance of science has been certainly due to "convincability" as well as to scepticism. May we add that we should have been glad of a more complete reply to De Costa's palæographical argument for Bordone's acquaintance with the Zeno map as early as 1521 (pp. 102, 103, mentioned with respect, but ignored on p. 104); that "Icaria" (pp. 89, 120, 121, etc.), if identical with Olaus' "Tile," has perhaps closer reference to "Tillemark," in Norway (one original for "Thule"), than to St. Kilda; that the identification of "Estotiland" with "Escociland," or Scotland, may appear to some more plausible than its suggested connection with the motto, "*Esto fidelis usque ad mortem;*" and that the Venetian relics said to have been brought back from the north by the Corte-real expedition in 1501, are possibly worth more than Mr. Lucas will allow—not, necessarily, as evidence of a Zeno voyage to the New World, but in other respects. It might have been well if more references from the "original accounts of Columbus" and others, containing the materials of Zeno's descriptions, had been given, as well as or even instead of the extracts (on pp. 81, 83) from Bordone's 'Isolario,' valuable as that is as an intermediary. Why should not the name *Drogeo* be a corruption for another "Boca del Drago," or Magellan's Straits (*Cola do Dragam* in Galvano, 'Discoveries of the World,' under A.D. 1428)? The identification of *Sinclair* with *Zichmni* is certainly very doubtful,* but has Mr. Lucas, in the pursuit of his very skilful argument for the pirate Wichmann as the missing link, made quite enough allowance for the intermediate forms *Zicno* or *Zinco* (pp. 45, 46, 54, 61, 93, 94, 96)? Can the *Terra de Lavoratore* of Bordone be fixed as exclusively Greenland and nothing else (p. 39)? Is it not rather a compound, like Henry Hudson's "Greenland," which

* He is justly sarcastic (p. 97) on the enthusiasm of a writer who, as late as 1894, claimed that "Henry [Sinclair] was the one and only discoverer of America, destined to bulk more and more largely to future Americans as their typical hero primæval." Mr. Miller Christy, I may say, does not feel sure that the Zeno map contains anything necessarily fraudulent. He draws attention to the very erroneous latitudes as a cause of shortcomings; also to the over-northerly position and comparatively correct shape of Greenland, both features observable in several other fifteenth-century maps, but not common in the cartography of the mid-sixteenth century. Also the names of the Zeno map are taken, though in a corrupted form, not from works of the sixteenth century, but from earlier books and charts. These suggestions go to strengthen the belief that there may have been, in the possession of the younger Nicolo Zeno, a rotten old map, such as he describes, of about the reputed date of the voyages in question. If Zeno had been concocting a purely fraudulent map, would he not have been likely to introduce some more recognizable features from the cartography of his own time?

is our Spitsbergen? The "Andrea Bianco" map of 1436 (referred to on pp. 105, 106, etc.) is probably only Bianco's re-edition of a thirteenth-century work, and should not be attributed to him except as editor or publisher. Prof. Gaffarel's conclusion (quoted on p. 152) is challenged; but the French scholar might still deny that Zeno "avait cherché a décrier Colomb et voulu le présenter comme le plagiaire des Zeni," as no one pretended that Columbus had ever seen the Zeno narrative, unpublished and unknown to the world at large, according to its own defenders, till 1558. Perhaps too much is made of the omission of personal names (pp. 154, 155); and the identification of St. Brandan's isle (as to which the mythical element is overpoweringly strong) with St. Kilda is open to many objections. Lastly, why is Benjamin of Tudela (p. 147) classed with such fable-mongers as Sir John Maudeville and Psalmanazaar? Is not Benjamin fairly reliable as far as Bagdad?

On the other hand, though the Zeno book has certainly produced a literature out of proportion to its importance (see p. 56), one is almost glad of the controversy when it results in a work so thorough and so far-reaching as this, one which will repay the most minute study, and is far more than it professes to be. For it is not only an indictment of a famous geographical legend; it is a valuable treatise for the history of discovery and cartography in the later middle ages. Especially admirable is the treatment of the Zeno map and its sources—the "Zamoiski," "Claudius Clavus," "Florentine," "Olaus Magnus," and others (pp. 99–124), and the exposure of the inconsistencies between this map and its accompanying text (p. 69, etc.); some of the reproductions, however, might have been clearer, *e.g.* that of a part of the "Catalan Atlas," on p. 107, or the Portolano and extract facing p. 111. The influence of Mercator and Ortelius in the history of this controversy is excellently stated; and so is the case for Iceland as an original of Zeno's "Frisland" (pp. 116, 117). The history of the latter name, in its various forms, is also very well discussed (on pp. 105, etc.); and the Zeno narrative is pointedly illustrated by Mr. Lucas' reference to the sufferings of the Icelanders in the fourteenth and fifteenth centuries at the hands of English and other filibusters or "fishermen" (p. 72).

In the Zeno controversy, as in so many others, political and racial prejudice has been deplorably prominent. A good instance of this is quoted (pp. 30, 31) from the diary of Dr. John Dee, when on November 28, 1577, he "declared to the Queen her title to Greenland, Estotiland, and Friseland;" and on June 30, 1578, told Hakluyt "of the Middle Temple" and others how "King Arthur and King Maty, both of them, did conquer Gelindia, lately called Friseland." The same prepossessions appear more mildly in Hakluyt and Zurla, more violently in Terra Rossa and "Caithness Events." Such a spirit has long been recognized as one of the worst obstacles to historical science; it is a regrettable instance of the vitality of prejudice that hardly a single Italian writer has openly rejected even the American pretensions of the Zeni.

RATZEL'S 'POLITICAL GEOGRAPHY.'*

Prof. Ratzel has done a service for which geographical students will be grateful, by bringing together for the first time in systematic form the data and problems with which political geography has to deal. The subject, as hitherto treated in our text-books, has been the driest and most unprofitable of all tasks. It was from this barren presentation of the subject that the general conception of "geography" was obtained, and it is no wonder that serious educationists treated it with contempt, and that it was despised and rejected at our universities. Our Society has had a hard struggle in its endeavour to show that this prevailing conception of geography was completely inadequate and unwarranted, and that when dealt with as it might be, and as it is in Germany, it was worthy even of a place in the university. Happily, the Society's efforts have met with a great measure of success, and with Prof. Ratzel's elaborate treatise of about 700 pages at our command, it may be shown that even the hitherto despised "Political Geography" may be made a study full of human interest, worthy of the serious attention of statesmen, political economists, and historians. As Prof. Ratzel points out, the "State" is often treated as if it were "in the air," and had no connection with the land on which communities live and move and have their being. Yet long ago Ritter showed the intimate relations which exist between humanity and the geographical stage on which it plays its part. With even more point and profundity Peschel did the same, though in a somewhat fragmentary way. Prof. Ratzel's 'Anthropogeography' may be regarded as a more systematic attempt to show the general relations between man and his geographical environment. Both in Germany and in France this line of investigation is being now carried out in detail, so that what may be called the literature of anthropogeography is assuming considerable dimensions.

In our estimation, anthropogeography is a convenient term under which to include all those aspects of geography that deal with the relations of humanity as a whole or divided into communities to the earth, with which alone physical geography has to deal. "Applied Geography" might be taken as an alternative term, though on the whole it has a wider scope. "Political Geography" may be regarded as a subdivision or special application of anthropogeography, and therefore Prof. Ratzel's latest work is a natural sequel to that on the more general subject. In 1881, Bluntschli, in referring to Ritter, pointed out what marked progress had taken place since his time in our knowledge of the physical geography of the land, and insisted that "a comprehensive and fundamental investigation into the influence of the physiognomy of the land on

* 'Politische Geographie.' Von Dr. Friedrich Ratzel. München und Leipzig. Verlag von R. Oldenbourg.

humanity would be of immense benefit to political science." Since 1881 progress in geographical research has made vast strides, so that ample material exists for the formidable task which Prof. Ratzel has so successfully completed. He has approached the subject from the purely geographical standpoint, and has adhered to that standpoint throughout. He points out that a "state," which may be anything from a tribe of nomads to a "Great Power," is inconceivable without a more or less extensive area of land on which to exercise its activities. Land and people in a political community are indissoluble; the one is as essential to its existence as the other. This may be taken as the text of Prof. Ratzel's treatise, and, standing firmly on the land, he considers systematically the various relations that exist between the two, and the influence which they exert on each other. Prof. Ratzel has faced the subject boldly and unflinchingly, and his book may be commended to the study of all serious students of geography. Naturally, in what may be regarded as a first attempt to construct a science of political geography, the author may have erred on the side of redundancy. Occasionally it looks as if he had emptied his note-book into his pages, instead of presenting us with a clean and clear statement of conclusions. But we must not expect too much from the quarryman, and we hardly consider this redundancy a fault; if it is, it is a fault in the right direction.

Prof. Ratzel divides his work into nine sections, each subdivided into several chapters, and, as will be seen, he follows on the whole the analytical method. In the first section he deals with the state and its territory (*Boden*). Here he works out some very interesting results from his conception of the state as an organism attached to the land, though this organic analogy may be carried too far. The "state," of course, may be a community at any stage of development, and it will often be found extremely useful to consider the mutual relation of people and territory in their more primitive forms. There is a special chapter on the relationship between territory and state, and another on the interesting point of "Possession and Dominion." The second section treats of "Historical Movement (*Bewegung*) and the Growth of the State." Many interesting problems are discussed in this section from the point of view of geography; among others, those of "Conquest and Colonization," "Political Regions" and "Natural Regions," "Spheres of Interest," "Internal Division and Union." Section III. deals with the "Fundamental Laws of the Territorial Expansion of the State," which is followed by two sections dealing with "Position" and "Dimensions." The latter term scarcely expresses the German "Der Raum," which Prof. Ratzel seems to use for the land available for political settlement and expansion, and under that head he deals with many important political problems. One of the most important sections is the sixth, which deals with "Boundaries," a subject abounding with points of interest. "Transition between Land and Sea" is the subject

of the seventh section, under which the coasts, peninsulas and isthmuses, and islands are dealt with. This is followed by a section on "The World of the Water," and another on "Mountains and Plains." There are many special maps in the text, and ample references appended to each section.

This brief *résumé* may afford some idea of the richly suggestive work which every serious student of geography is bound to consult. For the sake of geographical teachers who cannot read German, it is much to be wished that some enterprising publisher would issue an English translation; he would have to do so, we fear, as a labour of love, for it is doubtful if the sale would prove remunerative, at least in the immediate future. We commend the book to the notice of the Clarendon Press.

CIVIL TIME;

OR TABLES SHOWING THE DIFFERENCES IN TIME BETWEEN THAT USED IN VARIOUS PARTS OF THE WORLD AND GREENWICH MEAN TIME.

By JOHN MILNE, F.R.S.

[*It is requested that corrections and additions to these tables may be sent to Mr. John Milne, Royal Geographical Society, Savile Row, London.*]

PREFACE.

THE greater part of the information contained in the following tables is based upon replies to a circular which, through the kindness of the Foreign, Colonial, and India Offices, was forwarded to Her Majesty's representatives in various parts of the world.

This circular is here reproduced, first, because it explains the object of the tables; secondly, because it shows the difficulty there is in obtaining the information required; and thirdly, with the hope that persons interested in the matter of time differences will forward notes on the subject, especially in connection with countries and places not included in the following list.

"British Association, Burlington House, London, W.

To _____

"SIR,—It is, I think, remarkable that there appears to be no publication which shows the corresponding value in Greenwich mean time, of the local time employed throughout the world.

"Such a table is indispensable in order to determine accurately the instant of occurrence of earthquakes, sea-waves, magnetic phenomena, the despatch of telegrams, and many other events, the sequence of which in absolute time has to be determined.

"Although application has been made to the Royal Observatory at Greenwich, to the Royal Geographical Society, to the Central Telegraph Office in London, to the offices of cable companies, and to other possible sources of information, very little has been obtained.

"As a secretary of the British Association Committee whose names are appended, I desire to publish in their forthcoming report a table showing the differences between Greenwich mean time as used in England and Scotland and that of the civil times used in various parts of the world.

"By civil time I mean the time used by railways, telegraphs, and for ordinary public affairs.

"If different times are used in various parts of your country, I trust that you will be able to give information relating to the same.

"Feeling assured of the value of the table it is intended to compile, I sincerely trust that you will favour me with a full and explicit statement of the time generally employed in your country. If it is mean time, state the meridian; the observatory, or the place to which this refers; and also, as a check against any misunderstanding, please state distinctly the equivalent of December 1, 9 a.m. G.M.T. in the local time, or times adopted in your own country.

"I have the honour to remain, Sir,

"Your obedient servant,

"JOHN MILNE."

Although the notes based on the replies to the above are marked O.D. (Official Document), it must not be imagined that in all cases the information they convey is absolutely correct, but simply the best, and this in many instances after great trouble, that could be obtained.

A certain number of notes marked L.T.S. are taken from a "List of Time Signals" compiled by Captain T. H. Tizard, R.N., for the use of seamen, as an aid for ascertaining the errors and rates of chronometers, and published by order of the Lords Commissioners of the Admiralty. These signals, in most instances, refer to the mean time at certain ports, and therefore do not necessarily indicate the time used in chronicling events in newspapers, by the railways and telegraphs, and by the public at such places.

Much information relating to the railway and other times used in the United States, Canada, and Mexico, was obtained through Sir Sanford Fleming, Mr. W. F. Allen, and by reference to the 'Traveller's Official Guide,' published at 24, Park Place, 19, Barclay Street, New York. For further information in connection with India, see the 'Indian Telegraph Guide,' published in Calcutta.

Notes marked I.T.B. are compiled from information furnished to the International Telegraph Bureau in response to an inquiry reproduced in the Berne notifications. For these notes I am indebted to W. H. Preece, C.B., F.R.S., who obtained the same from Mr. R. J. Mackay. Those notes which refer to differences of time used for telegraph purposes show many inconsistencies, and judgment must be exercised in their acceptance.

In the table of difference of telegraph time as used by various cable companies and that of Greenwich mean time inconsistencies again appear; but even if the various entries do not in all cases refer to the standard time of the countries to which they are annexed, so long as they have a practical application it seems desirable to record the same. A glance at this table indicates the necessity of greater uniformity, whilst a comparison of the same with the entries which precede it shows that closer approximations are desirable. For example, we find, in the list of times used by telegraph companies, Tokio and Nagasaki entered as being respectively 9h. 18m. and 8h. 40m. fast on Greenwich time. As a matter of fact, the time used throughout Japan since January, 1888, has been 9h. fast on Greenwich.

When a time difference is given to within a second or a fraction of a second, it

must be remembered that such attempts at accuracy are dependent upon determinations of longitude which in themselves, for various reasons, are in most instances but rough approximations to the truth. As illustrative of the greatest accuracy with which this quantity has at present been obtained, we may refer to Madras, and for the accuracy of ordinary determinations to St. Helena.

The arrangement in the tables is alphabetical—in the first according to countries and islands, and in the second according to countries, islands, and towns. The letter F indicates that the time at a given place is "fast," or ahead of Greenwich mean time, whilst the letter S indicates that it is "slow," or behind that of Greenwich. West European time means Greenwich time. Mid or Central European time means one hour in advance of Greenwich. East European time means two hours in advance of Greenwich.

	h.	m.	s.	
ALGERIA	0	9	21 F.	I.T.B. The meridian of Paris. O.D.
ANNAM	(See COCHIN CHINA.)			
ARABIA—				
Aden	2	59	54 F.	Meridian of the saluting battery at Aden. O.D.
Muskat	3	54	24 F.	Meridian of Muskat Tidal Observatory. O.D.
Yemen	1	55	56 F.	I.T.B. Meridian of St. Sophia, Constantinople. O.D.
ARGENTINA—				
Buenos Aires	4	16	48·2 S.	This is Cordova time. This is the legal (civil) time for the whole republic, and is telegraphed each day to control the time-pieces in various cities. It is used by railway and telegraph offices, but many citizens in the provinces use a doubtful local time. O.D.
La Plata	3	51	38·95 S.	Local mean time. L.T.S.
AUSTRALIA—				
New South Wales	10	0	0 F.	Since December 22, 1894. On July 23, 1896, the Act was amended, and a time 9h. F. was applied to the municipal district of Broken Hill and the electoral district of Sturt in respect to Licensing and other Acts. O.D.
Queensland—				
Brisbane	10	0	0 F.	In the Standard Time Act of November 27, 1894, issued from the Surveyor-General's Office, Brisbane, there is a table showing the difference between the above time, which is that of the 150th meridian, and the local time of a large number of towns in Queensland. O.D.
South Australia*	9	0	0 F.	O.D.
Victoria—				
Melbourne	10	0	0 F.	O.D.
West Australia	8	0	0 F.	Since July 17, 1895. O.D.

* A bill to repeal the Act of 1894, and make standard time 9h. 30m. F., is now (January, 1899) under consideration.

	h. m. s.	
AUSTRIA	1 0 0 F.	For railways and for telegrams handed in at railway stations; but other offices keep Vienna time, which is 1h. 5m. 21s. F. I.T.B.
BAHAMAS—		
Nassau	5 9 29·5 S.	O.D.
BAHRAIN ISLANDS	Oriental time from "sunset to sunset." O.D. See SYRIA.	
BALEARIC ISLANDS—		
Palma	0 10 32 F.	O.D.
BARBADOS	3 58 29·2 S.	O.D.
BECHUANALAND	1 30 0 F.	Regulated by the Cape Town Signal. O.D.
BELGIUM	0 0 0	Since April 29, 1892, this has been the official time. It is used by railways, telegraphs, and the marine with the twenty-four hours' system, the day commencing after midnight. O.D.
BERMUDA—		
Ireland island	4 19 18·3 S.	Meridian of the clock tower, Bermuda dockyard. O.D.
BORNEO, DUTCH	Local mean time. See JAVA.	
BOSNIA	1 0 0 F.	I.T.B.
BRAZIL—		
Rio de Janeiro	2 52 41·1 S.	Meridian of the observatory. This is used by telegraphs, state railways, and by public offices throughout the greater part of the administration. It is regulated by an electric signal sent to all telegraph stations, and to the state railway each day. In some places a local time is employed. O.D.
BULGARIA	2 0 0 F.	Mean time of Eastern Europe. I.T.B.
BURMA—		
Rangoon	6 24 40 F.	Time ball observatory at Rangoon. O.D.
CANADA—		
East coast to 67½°	4 0 0 S.	Inter-Colonial time. Nova Scotia, Prince Edward's island. The time used on the railways from Halifax to Fort William is Eastern time.
67½° to 82½°	5 0 0 S.	Eastern time. New Brunswick, Montreal, Ontario.
82½° to 97½°	6 0 0 S.	Central time. Manitoba, Kewatin. This time is used from Port Arthur and Fort William to Brandon.
97½° to 112½°	7 0 0 S.	Mountain time. Saskatchewan, Assiniboia, Alberta, Athabasca. On the railway Brandon to Donald.
112½° to west coast	8 0 0 S.	Pacific time. British Columbia.

The above times are used by railways and telegraphs. Westward from Port Arthur the twenty-four hours system is used. The time 5h. 0m. 0s. S. on Greenwich is used for railways and telegraphs from Port Arthur and

		Fort William to the Atlantic coast. At St. John's (N.B.) a local mean time, 4h. 24m. 16s. S., is used, and local mean times are in use at other places. Halifax uses 4h. 0m. 0s. S. Yarmouth, N.S., has several times. For time used at Dividing Points, see UNITED STATES. O.D.
	h. m. s.	
CAPE COLONY	1 30 0 F.	Since February 8, 1892.
		Regulated by a time signal sent from the General Post Office, Cape Town, to all principal towns. O.D.
CAYENNE		No reply received.
CELEBES		Local mean time. See JAVA.
CEYLON—		Madras mean time used from May 1, 1898. Prior to this Colombo mean time, 5h. 4m. 21·9s. F., was used. O.D.
CHILE—		
Valparaiso	4 46 30 S.	This is telegraph time used by the offices of the West Coast of America Telegraph Company at Arica, Pisagua, Iquique, Antofagasta, Caldira, La Serena, Coquimbo, Valparaiso, Santiago, Talcahuano, Concepcion, and Coronel in Chile. O.D.
		Valparaiso mean time is given as 4h. 46m. 34s. S., L.T.S.
CHINA—	8 5 0 F.	This is used by the telegraph companies (Great Northern and Great Eastern). It is approximately Shanghai time. The foreigners at ports on the coast use their own local mean time.
		The Chinese at most places use an approximate apparent sun time, obtained from sun-dials. O.D.
Amoy	7 52 16·2 F.	Amoy Custom House mean time. L.T.S.
Chifu	8 5 40 F.	O.D.
Chunking	Local mean time should be 7h. 8m. 8s. F.	O.D.
Fuchau	7 57 46·5 F.	Mean time for the meridian of Pagoda anchorage, about 12 miles from Fuchau. O.D.
Hankau	7 37 20 F.	Meridian of Hankau, 114° 20′ 0″ E. O.D.
Hong Kong, Kaulung	7 36 41·7 F.	L.T.S.
Newchwang	8 9 2 F.	This is local mean time of the Chinese town of Zingtzu, known to foreigners as Newchwang. The real Newchwang is 30 miles to the north-east. O.D.
		The meridian used is that of the Custom House flagstaff, 122° 15′ 30″ E. This has recently been corrected to 122° 14′ 0″ E. A time gun is fired weekly at noon.
Pekin	7 45 54 F.	This is local mean time used by foreigners in Pekin and railways in North China. The telegraphs do not appear to keep a uniform time. It is not Pekin, Tientsin, Shanghai, nor apparent time. O.D.
Shanghai	8 5 43·2 F.	(Zikawei Observatory time). O.D.
	8 5 56·7	is Shanghai mean time. L.T.S.

	h. m. s.	
China (*continued*)—		
Swatau	7 46 55 F.	Swatau mean time. L.T.S.
Tientsin	7 49 12 F.	Naval school time. The Tientsin Town Hall clock should be 7h. 47m. F. The civil time is determined by the municipal chronometer, from which the community may every Saturday set their watches. This chronometer, however, has sometimes been known to have an error of three minutes. O.D.
Cochin China—		
Saigon	7 16 56 F.	This refers to the meridian of Saigon. This time is used in Lower Laos, Cambodia, Annam. O.D.
Tongking, Haifong	7 4 39·5 F.	Haifong mean time. L.T.S.
Colombia (Republic of)	4 56 16·4 S.	This is Bogota time, and is used at the principal towns. For certain smaller towns apparent solar time is in use. After December 1, 1898, it is expected that Bogota time will be used throughout the Republic. O.D.
		A variation of fifteen minutes in the public clocks of Bogota is not rare.
Congo Free State	1 0 0 F.	Throughout the territory. O.D.
Corsica—		
Ajaccio	0 25 36 F.	Time in Corsica is measured as that of the meridian 6° 24′ 12″ east of Paris, which corresponds to the Citadel Lighthouse of Ajaccio. O.D.
Costa Rica	5 36 13·13 S.	This is San José mean time, and is used for all purposes. O.D.
Cuba—		
Havana	5 28 50·45 S.	This refers to the meridian of the observatory. For contributions to the *Bulletin* of international meteorological observations, a difference of 5h. 30m. 0s. S. is used. O.D.
		5h. 29m. 23·57s. mean time of the meridian. L.T.S.
Curaçao	4 35 46·9 S.	Curaçao mean time. L.T.S.
Cyprus—		
Nicosia	2 14 0 F.	This is the time adopted at the stations of the Eastern Telegraph Company in Cyprus. O.D.
Denmark	1 0 0 F.	I.T.B.
Ecuador—		
Guayaquil	5 24 15 S.	(It may be noticed that this is 0h. 24m. 15s. fast on New York.) This time is used by the Central and South American Telegraph Company stations in Ecuador. O.D.
St. Elena	5 24 3 S.	O D.

	h.	m.	s.		
EGYPT	2	5	8·9	F.	This is the local mean time of the Abbasizeh observatory. It is used in Cairo, on the Nile, and by railways and telegraphs. O.D. See ALEXANDRIA.
Alexandria	2	4	30·5	F.	A time ball drops to show mean noon at the Great Pyramid. This is the official time for Egypt. O.D.
	1	59	33	F.	The time ball drops a second time for mean noon at Alexandria. O.D.
Port Said	2	9	15	F.	L.T.S.
FALKLAND ISLANDS	3	51	24	S.	O.D.
FIJI—					
Suva	11	55	44	F.	O.D.
FORMOSA	9	0	0	F.	I.T.B.
FRANCE	0	9	21	F.	I.T.B. Paris mean time. The *Standard* of April 7, 1898, says, "Lately the French Chamber of Deputies has passed a law which probably will be approved by the Senate, the text of which is, 'The legal time of France and Algeria is the time which is 9m. 21s. slow on Paris mean time.'" Paris mean time is used by telegraphs and railways, but real railway time is about 5m. slower than this, or 55m. slow on Central European time. Also generally the clocks inside stations are 5m. slow on those outside, these latter showing Paris mean time. Some years ago there was a difference between town time and railway time, but this distinction between a local mean time and Paris mean time is disappearing, and it is only at places without stations that the former is sometimes observed. The times of handing in and receipt of telegrams are usually marked.
GAMBIA—					
Bathurst	1	6	0	S.	Clocks are regulated weekly by the time kept at the telegraph station. O.D.
GERMANY	1	0	0	F.	I.T.B. Used generally.
Potsdam Observatory	0	52	15·4	F.	
Strassburg Observatory	0	31	47	F.	
GIBRALTAR	0	21	23	S.	At 10 a.m. daily a telegraph signal is received from Greenwich. O.D.
GOLD COAST—					
Accra	0	0	46	S.	Used throughout the Gold Coast. This is corrected every day by telegraph from Greenwich, and transmitted to all Government telegraph offices. O.D.

GREAT BRITAIN	Greenwich mean time is the standard time, and is with rare exceptions used for all purposes. Amongst these exceptions we find residents in Canterbury using a time about four minutes fast on Greenwich, and clocks at certain railway stations are sometimes one or two minutes fast. "Apparent Greenwich" and sometimes "local sun" time are used in connection with regulations relating to lamp-lighting. See IRELAND.	
	h. m. s.	
GREECE	1 34 53·7 F.	Meridian of Athens. I.T.B.
GUADELOUPE	4 4 0 S.	This approximate local time is regulated by occasional observations. The West Indian and Panama Canal Company use Demerara time, and the Cie Française des Câbles Télégraphiques that of Santiago de Cuba. O.D.
GUATEMALA	6 2 3 S.	Used for all purposes throughout the Republic. O.D.
GUIANA, BRITISH (DEMERARA)—		
George Town	3 52 39·5 S.	This is post office mean time, and is used throughout the colony.
	3 52 46 S.	is given as the time adopted by the West Indian stations of the West India and Panama Telegraph Company. O.D.
GUIANA, DUTCH—		
Paramaribo	3 40 35 S.	L.T.S. Paramaribo mean time.
HAWAII	10 30 0 S.	Called standard time. O.D.
HEJAZ	1 55 56 F.	See TURKEY. I.T.B.
HERZEGOVINA	1 0 0 F.	I.T.B.
HONDURAS, BRITISH—		
Belize	5 52 47 S.	The clock over the Court House, usually regulated by the time kept by ships in the harbour, is the one referred to by the public and public offices. O.D.
HUNGARY	1 0 0 F.	I.T.B.
ICELAND—		
Reykjavik	1 27 34 S.	O.D.
INDIA	In towns and villages in many parts of India, local and other time is announced by clocks striking, gongs, bells, guns—these signals being given from churches, treasury buildings, forts, telegraph offices, etc. Local time is determined for each place, where there is a Government telegraph office, with reference to its meridian, as so many minutes (the nearest minute to the exact time being taken) in advance of or behind the mean time of the Madras Observatory, which has been adopted as the standard time for the whole of India. This time is telegraphed daily from Madras to every telegraph office. Section XII. of the 'Indian Telegraph Guide,' published in Calcutta, consists of a closely printed table extending over forty-nine pages, showing the difference between Madras time and local mean time for all Government telegraph offices in India.	

INDIA (*continued*)—

Madras time is used on through lines of railway, and in recording the time of despatch of foreign telegraphic messages. For all other ordinary public and official transactions, as well as private business, local time is employed. To this, however, there appear to be exceptions, as in Rajputana, Delhi, Umballa, Simla, etc., where Madras time is employed for all purposes. O.D.

The determinations of the difference between Madras time and Greenwich mean time are as follows:—

	h.	m.	s.	s.
Series A.	5	20	59·750	±0·155
„ B.	5	20	59·010	±0·163
„ C.	5	20	59·115	±0·0227
„ D.	5	20	59·233	±0·127
„ E.	5	20	59·421	±0·125

Series C. is the most recently determined, and probably the most accurate. (Meteorological reporter to the Government North-West Provinces and Oudh.)

The Director of the Madras Observatory gives 5h. 20m. 59·4s. F. as the most correct. O.D.

Ajmere—
Merwara — Madras time is used, but at the Ajmere Observatory the time used is 22m. later than this. O.D.

	h.	m.	s.	
Baluchistan—				
Quetta	5	20	59·4	F. Madras or railway time. O.D.
Bengal—				
Calcutta	5	53	20·77	F. This time is in ordinary use at Bankura, Bhagalpur, Burdwan, Darjiling, Dinajpur, Hooghly, Howrah, Jalpaiguri, Jessore, Khulna, Malda, Midnapore, Murshidabad, Nadiya, Rajshahi, the Twenty-four Parganás. Madras time is used for railways and telegraphs. It is also used by the public at Champaran, Darbhanga, and possibly other places. A local mean time is also in use. O.D.
Bombay, Cólaba Observatory	4	51	15·7	F. L.T.S. This is local mean time used at the observatory.

Central Provinces—
Nagpur — Madras civil time. 5h. 20m. 59·4s. F. O.D.

Coorg—				
Merkasra	5	2	57	F. O.D.

Hyderabad — Madras or railway time used in Government offices, but local Amraoti time is 10m. S. on this. O.D.

Karachi	4	27	52	F. L.T.S.
Karikal (French India)	5	21	5·6	F. Madras time. O.D.

Lucknow — Madras time used by railways, telegraphs, and for public affairs. O.D.

	h. m. s.	
INDIA (*continued*)—		
Madras	5 20 59·4 F.	See INDIA.
Nepal		At Katmandu, the capital, there are neither railways nor telegraphs, and its longitude has not been accurately determined. O.D.
North-West Provinces—		
Allahabad		Madras time used by railways, telegraphs, and for public affairs. O.D.
Oudh		See ALLAHABAD. (Madras time.)
Panjim (Goa)	4 55 28·12 F.	This is official time. The West of India Portuguese railway use Madras time. O.D.
Pondichéry (French India)	5 21 5·6 F.	Madras time. O.D.
Rajputana		Madras time for railways, telegraphs, and public affairs. (Local time is therefore not in use.) O.D.
IRELAND	0 25 22 S.	I.T.B.
ITALY	1 0 0 F.	Since November 1, 1893, the hours are counted consecutively, one to twenty-four, from midnight. O.D.
JAMAICA	5 7 10·41 S.	This time is used throughout the island. O.D.
JAPAN	9 0 0 F.	Since January, 1888, this time has been used for all purposes. It is regulated daily by a time signal sent to all telegraph stations.
JAVA—		
Batavia	7 7 20 F.	For towns in Java and the Dutch East Indies, local mean time is used. For the railways, Batavia time is kept for West Java, Samarang time for Mid-Java, and Surabaya time for East Java. O.D.
Tanjong Priok	7 7 32·6 F.	L.T.S. Tanjong Priok mean time.
Surabaya	7 30 57·4 F.	L.T.S. Surabaya mean time.
KOREA	9 0 0 F.	I.T.B. O.D.
LAGOS	0 13 43 F.	A time signal is obtained daily by telegraph. The time shown by the station clock is 0h. 14m. 0s. F. O.D.
LEEWARD ISLANDS—		
Antigua	4 20 0 S.	The time used is that shown by the cathedral clock in the city of St. John, which is regulated by a daily telegraph signal from British Guiana, which is said to be 0h. 14m. 49s. fast on Antigua. O.D. See GUIANA, BRITISH.
MADAGASCAR—		
Antananarivo	3 10 7 F.	The meridian is that of the Observatory, 15° 11′ 30″ E. of Paris.
Tamatave	3 17 41 F.	O.D.
MALTA	1 0 0 F.	or Central European mean time since November 1, 1894. O.D.
MARTINIQUE	4 4 44 S.	Meridian of the St. Pierre lighthouse. O.D.

	h. m. s.	
MAURITIUS—		
Port Louis	3 50 12·6 F.	Meridian of the Royal Alfred Observatory. O.D.
		The railways keep a time 5m. behind that shown by the cathedral clock in Mexico, and this is telegraphed every morning to the stations on the line.
MEXICO—		
Mexico	6 36 31·56 S.	Longitude of the Central Meteorological Observatory at Mexico, and is the time kept on Mexican railways. O.D.
Mexico	6 35 0 S.	Statement by the Mexican Telegraph Company.
Tampico	6 15 0 S.	Ditto ditto.
Vera Cruz	6 24 0 S.	Ditto ditto.
MIQUELON	3 44 44 S.	O.D.
NATAL	2 0 0 F.	Throughout the colony, regulated by a signal from Durban. O.D.
NETHERLANDS (HOLLAND)		Greenwich mean time for railways, telegraphs, and post. Many places use Amsterdam mean time, which is approximately 20m. fast on Greenwich. Some places use Greenwich mean time or their own local time. O.D.
Amsterdam	0 19 39 F.	Amsterdam mean time. L.T.S.
Flushing	0 14 23·2 F.	Flushing mean time. L.T.S.
Hellevoetsluis	0 16 30·7 F.	Hellevoetsluis mean time. L.T.S.
Nieuwe Diep (Willemsoord)	0 19 6·4 F.	Nieuwe Diep mean time. L.T.S.
Rotterdam	0 17 59·1 F.	Rotterdam mean time. L.T.S.
NEW CALEDONIA	11 5 48 F.	O.D. This is stated as being 1h. 12m. 0s. F. on Queensland. See AUSTRALIA.
NEWFOUNDLAND—		
St. John's	3 30 49·5 S.	This is used for all purposes throughout the island, including telegraph offices, excepting that of Heart's Content, which uses its local time of 3h. 33m. 33s. S. on Greenwich mean time, and is obtained by signal from London. All foreign cable business is transmitted from Heart's Content with Greenwich time. O.D.
	3 30 43·1 S.	St. John's mean time. L.T.S.
NEW GUINEA, BRITISH		
Daru	9 32 52 F.	
Mouth of Mambari river	9 52 8 F.	
Port Moresby	9 48 36 F.	
Samarai	10 2 39 F.	
NEW GUINEA, DUTCH		Local mean time. See JAVA.
NEW ZEALAND	11 30 0 F.	This has been in use since 1868. O.D.
NICARAGUA	5 45 10 S.	This is based on the longitude of Managua. It is used between 11° 15′ 44″ N. lat. to 12° 46′ 0″ N. lat., and 84° 22′ 37″ W. long.

	h. m. s.	
		to 87° 12′ 31″ W. long. In this area we find the principal telegraph offices—Managua, Granada, San Juan del Sur, Leon, Chinandega, Corinto, Metagalpa, El Orotal, San Carlos, El Castillo. On the Atlantic coast (Greytown, Bluefield, Cape Gracias di Dios) the local time depending on longitude is used. An official time is not strictly observed. O.D.
NORWAY	1 0 0 F.	Since June 29, 1894. O.D.
ORANGE FREE STATE	1 30 0 F.	Regulated by the Cape Town signal.
PERSIA—		
Teheran	3 26 0 F.	This local mean time for Teheran is kept on the Indo-European telegraph system, and is practically the same for all stations on the north-south line to Bushir. It is regulated by a time signal received daily from Greenwich. Local mean time is also kept for Meshed and Ispahan.
		The Persians keep sun time, watches being set at sunset. In Teheran there is a mid-day gun fired by the time shown on a sun-dial. The tramway company keep gun-time. The railway trains start when full or when required.
		Persian telegraphists do not give time of issue or receipt of telegrams. O.D.
PERU—		
Arequipa	4 46 12 S.	As this is determined by primitive methods it may occasionally be in error one or two minutes.
Cable companies	4 46 30 S.	This is the time kept in the offices of the West Coast of America Telegraph Company at Callao, Lima, and Mollendo. See CHILE.
Central Railway		Mean Lima time. O.D.
Lima	5 8 9 S.	The meridian is that of the cathedral tower in Lima. O.D.
Yacasmayo		Time taken from steamers and by telegraph. O.D.
Paita Railway	5 28 0 S.	Time comes by cable from New York, and is then corrected. O.D.
Southern Railway		Arequipa time is used on the southern railways which extend from Mollendo to Puno on Lake Titicaca to Sicuani. This time is used in Mollendo, and probably at other places on the line. O.D.
Trujillo.		Time taken from steamers and by telegraph. O.D.
PESCADORES	9 0 0 F.	I.T.B.
PHILIPPINE ISLANDS—		
Manila	8 3 52 F.	Manila mean time. L.T.S.

	h. m. s.	
PORTUGAL—		
Lisbon	0 36 44·68 S.	This is the time at the Tapada Roya Observatory. It is also telegraph time. Railway clocks show a time five minutes slow on this. In the country towns a rough local time is kept.
RÉUNION	3 43 20 F.	The railway keeps a time 10m. slow on this.
RHODESIA	1 30 0 F.	Regulated by the Cape Town signal.
RUMANIA	2 0 0 F.	O.D. For telegraph purposes the meridian of Bucharest is employed. I.T.B.
RUSSIAN EMPIRE (Russia, Finland, Caucasus, Siberia, Turkestan)		Throughout the Russian Empire local mean times are used at observatories, for a complete list of which see 'Resumés Mensuels et Annuels des Observations Météorologiques,' anné 1895. For telegraphic purposes in Russia, St. Petersburg mean time is used. O.D.
		The following are examples of local mean time employed in the Russian Empire :—
Åbo	1 29 9 F.	L.T.S.
Char Kow	2 24 58·8 F.	
Ekaterinburg	4 2 32·9	O.D.
Helsingfors	1 39 48·5 F.	Helsingfors mean time. L.T.S.
	1 39 49·2 F.	O.D.
Irkutsk	6 57 15	O.D.
Kronstadt	1 59 3·6	L.T.S.
Nicolaeff (Black sea)	2 7 53·9 F.	L.T.S.
Pavlosk	2 1 54·7 F.	O.D.
Riga	1 36 22 F.	Riga (Sailors' Home mean time).
	1 36 28 F.	Polytechnique House time. L.T.S.
St. Petersburg	2 1 18·7 F.	Pulkova Observatory mean time. From the longitude of St. Petersburg, 30° 18′ 22″ E., it becomes 2h. 1m. 13·4s. F. L.T.S.
	2 1 4·7 F.	O.D.
Tashkent	4 37 10·8 F.	O.D.
Tiflis	2 59 5·7 F.	O.D.
Uleåborg	1 42 2 F.	L.T.S.
Vladivostok	8 47 33·5 F.	L.T.S.
ST. CROIX	4 19 43 S.	Meridian of St. Thomas. O.D.
ST. HELENA	0 22 50 S.	This is local time, but the ball at the time office drops at 1h. 0m. 0s. P.M. Greenwich mean time.
		Long. 5° 42′ 25″ W. approx. L.T.S.
		„ 5° 42′ 42″ W.
		„ 5° 42′ 30″ W. This is the longitude of Ladder Hill Observatory, and is used for local time.
		Long. 5° 40′ 28″ W. In some Admiralty charts.
		Long. 5° 43′ 55″ W. Admiralty chart, 1898.
		The difference between the two latter in time is 13·8s. O.D.

	h. m. s.	
St. John (West Indies)	4 19 43 S.	Meridian of St. Thomas. O.D.
St. Lucia—		
Castries	4 4 0 S.	L.T.S.
	4 4 1 S.	O.D.
St. Paul de Loanda	0 52 53·7 F.	St. Paul de Loanda mean time. L.T.S.
St. Pierre	3 44 44 S.	O.D.
St. Thomas	4 19 43 S.	Meridian of St. Thomas. O.D.
Samoa	11 26 59·7 S.	This is local mean time determined by observation at Ruge's Wharf, Apia harbour. O.D.
Senegal, French—		
Dakar, West Africa	1 9 42 S.	This return was furnished by Captain S. Harvard, of the French ship *Héroine*, who also gave the longitude of Dakar as 19° 45′ 35″ west of Paris. It is only used in the colony of Senegal proper. O.D. The telegraphs employ the mean time of the meridian of the roadstead of Dakar. I.T.B.
Servia	Meridian of Belgrade. I.T.B.	
Seychelles—		
Port Victoria	3 41 49·44 F.	O.D.
Siam—		
Bangkok	6 41 58·4 F.	This refers to the meridian of the old flag-staff at the palace, Bangkok. Time is wired daily to telegraph stations. The railway uses this time, but regulates its clocks five minutes *behind* it. O.D.
Sierra Leone—		
Freetown	0 52 58·3 S.	O.D.
Spain	Official time is determined by the meridian of each locality. Railway time is that of Madrid, and therefore an exception to the general rule. O.D. The telegraphs also use Madrid time.	
Algeciras	0 21 43	O.D.
Barcelona	0 8 38 F.	O.D.
Bilbao	0 11 42 S.	
Cadiz	0 25 10 S.	O.D.
	0 24 49·6 S.	For San Fernando. L.T.S.
Cartagena	0 3 59 S.	O.D.
Ferrol	0 32 51 S.	O.D.
Madrid and the railways	0 14 45 S.	O.D.
Malaga	0 17 44 S.	O.D.
Seville	0 23 58 S.	O.D.
Toledo	0 16 8 S.	O.D.
Valencia	0 1 29 S.	O.D.
Valladolid	0 18 52 S.	O.D.
Straits Settlements—		
Penang	6 41 22 F.	O.D.
Singapore	6 55 25·05 F.	O.D.

SUMATRA	h. m. s.	Local mean time. See JAVA.
SUNDA ISLANDS		Local mean time. See JAVA.
SWEDEN	1 0 14 F.	O.D.
SWITZERLAND	1 0 0 F.	I.T.B.
SYRIA—		
Beirut		The ordinary reckoning used in Mohammedan countries. Twelve o'clock is at sunset, which is the beginning of the day, and two periods of twelve hours pass till next sunset, when the watch is set backwards or forwards according to the season. The observatory at Beirut uses its mean time, 2h. 21m. 53s. ± 2s. F. O.D.
		Telegraphs and the Beirut-Damascus Railway do not keep accurate time.
TASMANIA—		
Hobart	10 0 0 F.	Since August 23, 1895. O.D.
TONGA—		
Nukualofa	11 40 48·12 F.	This is a local mean time kept throughout the kingdom. This time is verified by the chronometers of men-of-war, mail steamers, and by meridian altitudes. O.D.
		The longitude of Nukualofa town flagstaff is 175° 12′ 3″ W., but because all business relations, with the exception of Samoa, are in east longitude, east longitude time for the day of the week and month are kept.
TRANSVAAL	1 30 0 F.	O.D.
TRINIDAD	4 6 2·5 S.	This is local mean time for the meridian of Port of Spain. The accuracy with which it is kept depends upon comparisons with a regulator and a ship's chronometer, and it is not great. O.D.
TRIPOLI	1 55 56 F.	Like Turkey. I.T.B.
TUNIS	0 9 21 F.	I.T.B. This is Paris time. O.D.
TURKEY	1 55 56 F.	I.T.B.
	2 0 0	O.D.
UNITED STATES—		
East coast to 82½°	5 0 0 S.	Eastern time. Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, Rhode Island, New Jersey, Pennsylvania, Maryland, Virginia, N. Carolina, S. Carolina, Georgia, Florida.
82½° to 97½°	6 0 0 S.	Central time. Minnesota, Wisconsin, Michigan, Iowa, Illinois, Indiana, Ohio, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, Alabama, Louisiana.
97½° to 112½°	7 0 0 S.	Mountain time. Montana, Dakota, Wyoming, Nebraska, Utah, Colorado, Kansas, Arizona, New Mexico, Texas.
112½° to west coast	8 0 0 S.	Pacific time. Washington, Oregon, Idaho, Nevada, California. L.T.S.
		The time of "handing in" is not stated on telegrams. I.T.B.

Dividing Points.

On the time used for city or local purposes at Dividing Points between the standard time sections in the United States and Canada. C.T. = Central Time; M.T. = Mountain Time; P.T. = Pacific Time; E.T. = Eastern Time. The names of states, etc., are abbreviated in the usual manner.

Between Central and Mountain Sections.

Alliance, Neb.	M.T. locally.	Mandan, N. Dak.	M.T. locally.
Brandon, Man.	C.T. „	McCook, Neb.	M.T. „
Dodge City, Kan.	C.T. for city.	Minot, N. Dak.	C.T. „
Ellis, Kan.	C.T. locally.	North Platte, Neb.	C.T. „
El Paso, Tex.	M.T. „	Oakley, Kan.	M.T. „
Holyoke, Colo.	C.T. „	Portal, N. Dak.	C.T. „
Hoisington, Kan.	C.T. „	Phillipsburg, Kan.	C.T. „
Long Pine, Neb.	C.T. „	Texline, Tex.	M.T. „

Between Mountain and Pacific Sections.

Barstow, Cal.	M.T. locally.	Hope, Idaho	P.T. locally.
Deming, N.M.	M.T. „	Huntington, Oregon	P.T. „
Donald, B.C.	P.T. „	Mojave, Cal.	P.T. „
E. Spokane, Wash.	M.T. „	Ogden, Utah	M.T. „

Between Eastern and Central Sections.

Asheville, N.C.	E.T. locally.	Jamestown, N.Y.	E.T. locally.
Ashley Junction, S.C.	E.T. „	Kane, Pa.	E.T. „
Athens, Ga.	C.T. for city.	Kenova, W. Va.	C.T. „
Atlanta, Ga.	C.T. „	Mount Jewett, Pa.	E.T. „
Augusta, Ga.	E.T. „	Oil City, Pa.	E.T. „
Benwood, W. Va.	E.T. locally.	Parkersburg, W. Va.	E.T. for city.
Bristol, Tenn.	E.T. „	Pittsburg, Pa.	E.T. „
Buffalo, N.Y.	E.T. for city.	Port Huron, Mich.	E.T. „
Butler, Pa.	E.T. locally.	St. Thomas, Ont.	E.T. „
Columbia, S.C.	E.T. „	Salamanca, N.Y.	E.T. locally.
Corry, Pa.	E.T. „	Salisbury, N.C.	E.T. „
Detroit, Mich.	C.T. legal time	Sarnia, Ont.	E.T. city.
Local time is 28m. fast on C.T.		Sault Ste. Marie, Mich.	C.T. locally.
Dunkirk, N.Y.	E.T. for city.	Sault Ste. Marie, Ont.	E.T. „
Erie, Pa.	E.T. „	Sheffield Junction, Pa.	E.T. „
Fort William, Ont.	C.T. „	Union City, Pa.	E.T. „
Foxburg, Pa.	E.T. „	Washington, Pa.	E.T. for city.
Franklin, Pa.	E.T. „	West Clifton Forge, Va.	E.T. locally.
Gainesville, Ga., city uses mean local time.		Wheeling, W. Va.	E.T. for city.
		Windsor, Ont. (see Detroit).	
		Clifton Forge, Va.	E.T. locally.

The railroads meeting or passing through the above places use at least two times differing by an hour, one for the westward-bound trains, and the other for those bound eastwards. At El Paso, Tex., where lines converge from various directions, there are four kinds of railway time: C.T. for the Southern Pacific-Atlantic System, Texas and Pacific; M.T. for the Atchison, Topeka, and Santa Fe; P.T. for the Southern Pacific-Pacific System; City of Mexico time for the Mexican Central.

There are but few points of importance where mean solar time is used in the United States. It is used at Detroit, Michigan (population 200,000), and Savannah, Ga. (population 44,000). There are also a few points mostly in Ohio, Indiana, and Michigan. For further information, see 'Travellers' Official Guide of the Railways and Steam Navigation Lines in the United States, Canada, and Mexico,' from which the above tables were taken, 24, Park Place, New York.

	h. m. s.	
URUGUAY—		
Monte Video	3 44 49·56 S.	This is local mean time, and is supposed to be used throughout the country. Railway time is about 5m. slower than this. O.D.
WINDWARD ISLANDS—		
Grenada	4 6 59·40 S.	
St. Vincent	4 5 0 S.	This is about the time. It depends on a periodical telegram from Demerara, and on the time from ships of war when the clocks are set. O.D.
ZULULAND	2 0 0 F.	Every day, excepting Sundays, a telegraphic time signal is received from Durban. O.D.

TABLES ISSUED BY TELEGRAPH COMPANIES.

They may now be different. See Preface.

December 1, 1898.

Place.	Eastern Telegraph Company, Ltd., July 1, 1897.	Indo-European Telegraph Company, Ltd., Oct. 1897.	Western Union Telegraph Company.
	h. m.	h. m.	h. m.
Acapulco	6 36 S.	—	—
Accra	—	—	—
Adelaide	9 0 F.	9 14 F.	9 14 F.
Aden	3 0 F.	—	3 0 F.
Agra	—	5 11 F.	—
Akyab	6 11 F.	6 11 F.	—
Alexandria	2 5 F.	—	1 59 F.
Algiers	0 10 F.	—	0 11 F.
Amoy	8 5 F.	7 52 F.	7 52 F.
Amsterdam	—	—	0 19 F.
Assuncion	3 50 S.	—	—
Athens	1 35 F.	—	1 34 F.
Auckland	11 23 F.	11 32 F.	—
Augusta, Ga.	—	—	6 0 S.
Bahia	2 52 S.	—	2 33 S.
Baltimore	—	—	5 0 S.
Bangkok	6 41 F.	6 41 F.	—
Banjoewangie	7 7 F.	7 37 F.	—
Barbados	3 58 S.	—	3 58 S.
Batavia	7 7 F.	7 7 F.	—
Bathurst (Africa)	1 6 S.	—	—
Bathurst (New South Wales)	—	9 16 F.	—
Belize	5 53 S.	—	5 53 S.
Bencoelen	—	6 49 F.	—
Benguella	0 53 F.	—	—
Berlin	1 0 F.	0 53 F.	0 53 F.

Place.	Eastern Telegraph Company, Ltd., July 1, 1897.	Indo-European Telegraph Company, Ltd., Oct. 1897.	Western Union Telegraph Company.
	h. m.	h. m.	h. m.
Bermuda	4 19 S.	—	4 19 S.
Berne	1 0 F.	—	0 29 F.
Bogota	4 57 S.	—	4 57 S.
Bombay	5 21 F.	4 51 F.	4 51 F.
Bona	0 10 F.	—	—
Bonny	0 28 F.	—	—
Borneo	7 39 F.	—	—
Boston	—	—	5 0 S.
Bremen	—	—	0 35 F.
Brest	0 18 S.	—	0 18 S.
Brisbane	10 0 F.	10 12 F.	—
Brussels	—	—	0 17 F.
Buenos Ayres	4 16 S.	—	3 53 S.
Bushir	3 23 F.	3 23 F.	—
Bussora	—	3 11 F.	—
Cadiz	0 15 S.	—	0 25 S.
Cairo	2 5 F.	—	2 5 F.
Calcutta	5 21 F.	5 53 F.	5 53 F.
Callao	5 8 S.	—	5 8 S.
Canton	7 33 F.	7 33 F.	—
Cape de Verd islands	1 40 S.	—	1 40 S.
Cape Town	1 30 F.	—	1 13 F.
Cayenne	3 29 S.	—	3 29 S.
Ceara	2 34 S.	—	2 34 S.
Charlestown	5 20 S.	—	5 0 S.
Chicago	5 50 S.	—	6 0 S.
Christchurch, New Zealand	11 32 F.	11 32 F.	11 32 F.
Christiania	1 0 F.	—	0 43 F.
Colombo	5 19 F.	5 19 F.	—
Conception	4 52 S.	—	4 52 S.
Constantinople	2 0 F.	1 56 F.	1 56 F.
Copenhagen	1 0 F.	—	0 50 F.
Copiapo	4 42 S.	—	—
Coquimbo	4 45 S.	—	4 45 S.
Dallas, Texas	—	—	6 0 S.
Delagoa bay	2 12 F.	—	—
Denver	—	—	7 0 S.
Detroit	—	—	6 0 S.
Dunedin	11 22 F.	11 22 F.	—
Durban	1 58 F.	—	2 2 F.
Duxbury	4 44 S.	—	—
Fernando Po	0 36 F.	—	—
Florence	—	—	0 45 F.
Fuchau	8 5 F.	—	—
Funchal	1 8 S.	—	1 8 S.
Gainsville	—	—	6 0 S.
Galle	5 20 F.	5 20 F.	—
Galveston	—	—	6 0 S.
Genoa	—	—	0 36 F.
George Town (Demerara)	3 53 S.	—	3 53 S.
Gibraltar	0 21 S.	—	0 21 S.
Graham's Town	1 46 S.	—	—
Great Salt Lake City (Utah)	7 28 S.	—	—
Guatemala	6 2 S.	—	6 2 S.
Guayaquil	5 19 S.	—	5 19 S.
Halifax	4 15 S.	—	5 0 S.
Hamburg	—	—	0 39 F.
Havana	5 29 S.	—	5 29 S.
Heart's Content	3 34 S.	—	—
Hobart Town	8 5 F.	9 50 F.	—

Place.	Eastern Telegraph Company, Ltd., July 1, 1897.	Indo-European Telegraph Company, Ltd., Oct. 1897.	Western Union Telegraph Company.
	h. m.	h. m.	h. m.
Hokitika	11 24 F.	11 24 F.	—
Hong Kong	8 5 F.	7 36 F.	7 36 F.
Honolulu	10 31 S.	—	10 31 S.
Houston, Texas	—	—	6 0 S.
Ispahan	—	3 27 F.	—
Ivercargill	—	11 12 F.	—
Jamaica	5 6 S.	—	5 6 S.
Jerusalem	2 21 F.	2 21 F.	—
Jitomir	—	1 55 F.	—
Juan Fernandez	5 16 S.	—	—
Kabul	4 57 F.	—	—
Kansas city	—	—	6 0 S.
Kertch	—	2 26 F.	—
Key West, Fla.	5 26 S.	—	5 26 S.
Kingston (Jamaica)	5 7 S.	—	5 7 S.
Kioto	9 0 F.	—	—
Kurrachi	5 21 F.	4 27 F.	—
Lahore	—	4 57 F.	—
Larnaca	2 14 F.	—	—
Lima	5 8 S.	—	5 8 S.
Lisbon	0 36 S.	—	0 36 S.
Loanda	0 53 F.	—	—
Madeira	1 7 S.	—	1 7 S.
Madras	5 21 F.	5 21 F.	5 21 F.
Madrid	0 15 S.	—	0 15 S.
Malacca	6 49 F.	6 49 F.	—
Malta	0 58 F.	—	0 58 F.
Manila	8 3 F.	8 3 F.	8 3 F.
Marseilles	0 10 F.	—	0 21 F.
Mauritius	3 50 F.	3 50 F.	3 50 F.
Mecca	2 0 F.	2 40 F.	—
Melbourne	10 0 F.	9 40 F.	9 40 F.
Memphis	—	—	6 0 S.
Mendoza	4 35 S.	—	—
Mexico	6 36 S.	—	6 36 S.
Milan	—	—	0 37 F.
Milwaukee	—	—	6 0 S.
Minneapolis	—	—	6 0 S.
Mobile, Ala.	—	—	6 0 S.
Montevideo	3 45 S.	—	3 45 S.
Montreal	4 54 S.	—	5 0 S.
Moscow	—	—	2 30 F.
Mossamedes	0 49 F.	—	—
Moulmein	6 30 F.	6 30 F.	—
Mozambique	2 43 F.	—	2 43 F.
Munich	—	—	0 46 F.
Nagasaki	9 0 F.	8 40 F.	8 40 F.
Nanking	—	7 55 F.	—
New Orleans	6 0 S.	—	6 0 S.
Newport	6 4 S.	—	5 0 S.
New York	4 56 S.	—	5 0 S.
Nice	—	—	0 22 F.
Norfolk, Va.	—	—	5 0 S.
Odessa	2 2 F.	2 2 F.	2 2 F.
Otago	11 23 F.	—	—
Panama	5 18 S.	—	5 18 S.
Para	2 52 S.	—	3 14 S.
Paranahyba	2 47 S.	—	—
Paris	0 10 F.	—	0 9 F.
Pekin	7 46 F.	7 46 F.	7 46 F.

Place	Eastern Telegraph Company, Ltd., July 1, 1897.	Indo-European Telegraph Company, Ltd., Oct. 1897.	Western Union Telegraph Company.
	h. m.	h. m.	h. m.
Penang	6 42 F.	6 42 F.	—
Pensacola, Flo.	—	—	6 0 S.
Perim	3 0 F.	—	—
Pernambuco	2 20 S.	—	2 20 S.
Perth, West Australia	—	7 43 F.	—
Philadelphia	5 1 S.	—	5 0 S.
Pondicherry	—	5 19 F.	—
Port Darwin	9 0 F.	8 44 F.	—
Portland	—	—	8 0 S.
Port Nolloth	1 8 F.	—	—
Porto Rico	4 26 S.	—	4 26 S.
Pouna	—	4 55 F.	—
Pretoria	1 54 F.	—	1 54 F.
Principe	0 40 F.	—	—
Providence, R.I.	—	—	5 0 S.
Quebec	4 45 S.	—	5 0 S.
Quito	5 13 S.	—	5 13 S.
Rangoon	6 20 F.	6 20 F.	—
Rio Grande do Sul	2 52 S.	—	3 29 S.
Rio de Janeiro	2 52 S.	—	2 52 S.
Rome	1 0 F.	—	0 49 F.
Saigon	7 6 F.	7 6 F.	—
St. Louis	6 0 S.	—	6 0 S.
St. Paul	—	—	6 0 S.
St. Petersburg	2 1 F.	—	2 1 F.
St. Thomas	4 19 S.	—	4 19 S.
St. Thomé	0 26 S.	—	—
St. Vincent (Cape de Verd)	1 40 S.	—	1 40 S.
Salonica	1 0 F.	—	1 32 F.
Samarang	7 7 F.	7 21 F.	—
Sandwich islands	10 31 S.	—	10 31 S.
San Francisco	8 8 S.	—	8 0 S.
San José	5 35 S.	—	5 35 S.
Santa Catharina	3 13 S.	—	3 13 S.
Santiago de Chili	4 43 S.	—	4 43 S.
Santos	3 6 S.	—	3 6 S.
Savannah	—	—	6 0 S.
Scio	2 0 F.	—	1 44 F.
Shanghai	8 5 F.	8 5 F.	8 5 F.
Sierra Leone	0 53 S.	—	—
Simla	—	5 1 F.	—
Singapore	6 55 F.	6 55 F.	6 55 F.
Smyrna	2 0 F.	1 49 F.	1 49 F.
Sourabaya	7 7 F.	7 30 F.	—
Stockholm	—	—	1 12 F.
Suakin	2 29 F.	—	2 29 F.
Suez	2 5 F.	—	2 10 F.
Sukum Kaleh	—	2 44 F.	—
Sydney	10 0 F.	10 5 F.	—
Tabriz	—	3 5 F.	—
Tamatave	3 17 F.	—	—
Tangier	0 23 S.	—	—
Teheran	3 25 F.	3 25 F.	—
Tiflis	—	2 59 F.	—
Tokio	9 0 F.	—	9 18 F.
Toronto	5 18 S.	—	5 0 S.
Trieste	1 0 F.	—	0 55 F.
Trinidad	4 6 S.	—	4 6 S.
Tripoli	2 0 F.	—	0 52 F.
Truxillo	5 16 S.	—	5 16 S.

Place.	Eastern Telegraph Company, Ltd., July 1, 1897.	Indo-European Telegraph Company, Ltd., Oct. 1897.	Western Union Telegraph Company.
	h. m.	h. m.	h. m.
Tunis	0 40 F.	—	0 40 F.
Valdivia	4 53 S.	—	4 53 S.
Valentia (Ireland)	0 41 S.	—	—
Valparaiso	4 46 S.	—	4 46 S.
Vancouver island	8 14 S.	—	8 0 S.
Venice	—	—	0 49 F.
Vera Cruz	6 25 S.	—	6 25 S.
Vienna	1 0 F.	—	1 5 F.
Vigo	0 15 S.	—	0 35 S.
Villa Real	0 36 S.	—	0 29 S.
Warsaw	—	1 24 F.	—
Washington	5 8 S.	—	5 0 S.
Wellington	11 38 F.	11 38 F.	11 38 F.
Yeddo	—	9 18 F.	—
Yokohama	—	—	9 19 F.
Zanzibar	2 37 F.	—	2 37 F.
Zürich	—	—	0 34 F.

Original Time.

The following table gives the particulars of the time recognized by the forwarding country (see footnote) :—

Austria.	Mid-Europe.
Bavaria.	Mid-Europe.
Belgium.	West Europe.
Bosnia-Herzegovina.	Mid-Europe.
Bulgaria.	East Europe.
Cape Colony and Orange Free State.	One and a half hour in advance of Greenwich.
Cochin China and Cambodia.	Saigon.
Denmark.	Mid-Europe.
Egypt.	Cairo.
France and Algeria.	Paris.
Germany.	Mid-Europe.
Great Britain and Ireland.	Greenwich.
Greece.	Athens.
Holland.	West Europe.
Hungary.	Mid-Europe.
India.	Madras.
Italy.	Mid-Europe.
Japan.	Kioto.
Java and Sumatra.	Batavia.
Luxemburg.	West Europe.
New South Wales.	Ten hours in advance of Greenwich.
Norway.	Mid-Europe.
Portugal.	Lisbon.
Queensland.	Ten hours in advance of Greenwich.
Roumania.	East Europe.
Russia.	St. Petersburg.
Senegal.	St. Louis.

Servia.	Mid-Europe.
Siam.	Bangkok.
South Australia.	Nine hours in advance of Greenwich.
Spain.	Madrid.
Sweden.	Mid-Europe.
Switzerland.	Mid-Europe.
Tasmania.	Ten hours in advance of Greenwich.
Tunis.	Tunis.
West Turkey.	Mid-Europe.
East Turkey, including Hedjaz, Yemen, and Tripoli.	East Europe.
Victoria.	Ten hours in advance of Greenwich.
Würtemberg.	Mid-Europe.

Local time is used at the companies' stations, except at places where telegraphs are under Government control.

On telegrams from North America London time is signalled (*pro ex.*, see Newfoundland).

[Extracted from the Rules and Regulations of the Eastern Telegraph Company, the Eastern Extension, Australasia and China Telegraph Company, West African Telegraph Company, the Europe and Azores Telegraph Company, and the Eastern and South African Telegraph Company.]

THE MONTHLY RECORD.

EUROPE.

Landslip at Airolo.—On December 27, a serious landslip occurred from the Sasso Rosso, above Airolo, on the St. Gothard railway, resulting in the loss of three lives and the destruction of the Hotel Airolo and several adjacent houses. The volume of the material which fell is calculated at 400,000 cubic metres (14,000,000 cubic feet). In the opinion of Swiss geologists the danger is not yet over, as a mass of rocks equal to that which has already fallen remains suspended on the flank of the mountain, and, apparently, has yet to come away.* It is hoped, however, that it may be detached in smaller masses than was the case in the first slip. The summit of the Sasso Rosso is nearly 4000 feet above Airolo. The recent slip was but small compared with some of the historic catastrophes of similar nature, the material which fell at Brienz in 1749 having been calculated at over one hundred times the volume given above.

AFRICA.

The Geology of Southern Morocco and the Atlas Mountains.—At the meeting of the Geological Society on January 18, a paper on this subject, by the late Mr. Joseph Thomson, was read. The paper gives the results of observations made under considerable difficulties during a journey in Morocco in 1888. The tract traversed is roughly triangular, the base being the Atlantic ocean between Saffi and Agadir, and the apex the district of Dunnat, on the northern slopes of the Atlas, some 60 miles east of the city of Morocco. This district consists of three main sections:—(1) The Coast Lowlands; (2) The Plateau in two chief steps, the northern rising to 2000 and the southern to 5000 feet; (3) The Atlas itself, which only begins to be a mountain chain about 30 miles from the coast, and which ranges first east-by-north and then north-east in its central and

* Further slips, on a minor scale, have since been reported.

loftiest part. (1) The Lowlands are practically coterminous with the Tertiary deposits, amongst which apparently Eocene, Miocene, and Pliocene rocks are represented. The latter consist of shelly sands 200 to 300 feet thick, gradually rising to a height of 700 feet to the south and east of Saffi. Its surface is often covered with the slaggy tufaceous crust described by Maw. The local presence of this crust and the porous character of the deposit elsewhere has preserved it from denudation, so that, in the opinion of the author, its surface still presents the appearance of the Tertiary sea-bed on which it was formed. Certain quarry-like pits, one of which contains a pillar of white crystalline carbonate of lime, are supposed to be due to the explosion of steam connected with the existence of hot springs. (2) The Plateau is underlain by three rock-formations: (*a*) Metamorphic rocks, including clay-slates, which probably underlie the whole plain of Morocco and rise into a group of rugged hills called the "Jebelet," in contradistinction to the "Jebel," the Atlas proper. (*b*) The Lower Cretaceous rocks, consisting of red shales and sandstones, the former frequently giving rise to salt springs, and containing salt-deposits at Demnat, in the Atlas. (*c*) The Upper Cretaceous rocks, chiefly white and cream-coloured limestones, which attain their greatest development on the plateau. (3) The Atlas itself is made up for the most part of the same rocks. There is a core of Metamorphic rocks, which is better developed and wider at the western end of the range, and narrower towards the east. Next comes the great development of the Lower Cretaceous strata, followed by a diminutive representative of the Upper Cretaceous rocks. These rocks are much broken by folding and faulting, and their structure is displayed in several sections taken across the range from Demnat westward. The first signs of glacial action were met with at Titula, consisting of moraine-like heaps of *débris*; elsewhere, scratched stones were found. The boulder deposits described by Maw were not seen either to east or west of the place described by that author; but Maw's original section was not traversed, and the present author does not offer any opinion on the origin of the beds. Intrusive basalts penetrate the Cretaceous rocks and porphyrites, diorites, and other igneous rocks, the Metamorphic rocks of the central core.

New Ascent of Kilimanjaro.—The second number of the new volume of *Globus* records the ascent by Captain Johannes, commandant of the German station at Moshi, of the Kibo crater of Mount Kilimanjaro, it being the first occasion on which the crater was reached by a European since Dr. Mayer's ascent. Five days were occupied in the task, a succession of bivouacs being made on the mountain, for which the sleeping-bags left behind by Dr. Mayer proved of much service. The last bivouac was made on October 7, at a height of 15,400 feet, from which point the remaining distance was accomplished on the following day, the party starting at 4.15 a.m., and reaching the summit known as the "pulpit" soon after midday, quite exhausted. The Hans Mayer gap was quite free from snow and ice. The highest summit was not ascended, but, photographs and temperature observations having been taken, the descent to Moshi was made in two days. In the gap of the crater-wall, at a height of 19,000 feet, the dry-bulb thermometer registered 40° Fahr., the wet-bulb 28·4°, at 1 p.m.

Journey across the Equatorial Forest.—Mr. Albert B. Lloyd, lay missionary in Uganda, has lately returned to England after a rapid and successful journey to the West Coast by way of the great equatorial forest and the Congo. His route through the forest lay, in its first portion, somewhat to the south of Stanley's, but seems to have coincided roughly with that of M. Versepuy and Baron de Romans in 1896. Mr. Lloyd has communicated to the press some interesting details respecting the journey. Starting from Toru, east of Mount Ruwenzori, on September 19 last, with two native servants and a few porters, he struck south for Fort Katwe,

and followed the Semliki down to Mbeni, the extreme outpost of the Congo State. Regarding the situation in Toru, he reports marvellous progress under the administration of Captain Sitwell, the country having remained quiet during all the disturbances in Uganda. Leaving Mbeni on October 1, Mr. Lloyd at once entered the forest, in the gloomy shades of which he remained for twenty days. He was fortunate in entering into friendly relations with the pygmies, some of whom he was able to photograph. None of those which he measured reached a height of 4 feet. He was struck by the beards of the men, reaching halfway down their chests, which gave them a singular appearance. Although this feature was not observed by Stanley or Stuhlmann, bearded individuals were seen by Emin in the Monbuttu country, and the dwarfs have obtained from the Arabs the nickname "Fathers of the span-long beard." Mr. Lloyd passed only a few small villages, occupied by so-called Arabs, which serve as auxiliary Belgian stations. At times he came upon fairly good tracks, but at others it was necessary to cut a way through the undergrowth. Perpetual twilight reigned, and a death-like stillness, broken only by the crash of fallen trees, which sometimes put the travellers in danger. The trunk of one which had fallen across the track measured 20 feet in circumference. Striking the Ituri, Mr. Lloyd followed that stream through an almost uninhabited wilderness, and, launching two canoes on the Aruwimi, floated down to the Congo, embarking on the river steamer at Basoko. Leopoldville was reached on November 24.

Dwarfs in the Interior of the Cameroons.—Although reports of a race of small stature in the interior of the Cameroons have been current for some years, no traveller had until last year been able to verify the rumour by his own observation. Quoting from the *Allgemeine Wissenschaftliche Berichte*, the *Deutsche Rundschau* (vol. xxi. No. 2) announces that the first accurate information respecting such a race was obtained last year by the Bulu expedition of the German military force. Seven individuals of the pygmy tribe were, after much difficulty, brought to the camp through the instrumentality of a native chief. Some of them showed traces of admixture with other tribes, but one woman, who seemed to possess the typical characters of the race, was carefully measured, and had a height of almost exactly 4 feet. The colour was a chocolate-brown to copperish, the palms of the hands alone being of a yellowish white. The hair was deep black, thick, and frizzled; the skull broad and high; the lips full and swollen. The mode of life seems to resemble that of other pygmy tribes, as they are very shy, wandering about from place to place, and avoiding frequented routes. They are skilled hunters, and collect much rubber, but dispose of it to other tribes for transport to the coast. Prof. Virchow, speaking of these people before the Berlin Anthropological Society in November last (*Deutsche Rundschau*, No. 4), said that, apart from their small size, they possess all the characters of true negroes, especially in their hair; and that, like the other pygmy tribes, they must be regarded as the remains of a primitive population, from which the various negro tribes have been derived.

The Re-organization of the Sudan.—The recent Anglo-Egyptian Convention regarding the government of the Sudan defines that region as all the territories south of 22° N. lat., whether never evacuated by Egypt since 1882, or temporarily lost and reconquered, already or in the future, by the British and Egyptian Governments. Both Wady Halfa and Suakin are thus included within its limits. For administrative purposes the region is divided into four first-class and three second-class districts, the former being Omdurman, Sennar, Kassala, and Fashoda. Omdurman district extends up the White Nile to Abu Hasa, and up the Blue Nile to Abu Harraz. Throughout the whole Sudan the British and Egyptian flags will be used together, except at Suakin, where the Egyptian flag alone will be used. The supreme military and civil command is vested in the governor-general.

AMERICA.

Report on Ports in the Province of Buenos Ayres.*—We have received the first part of an elaborate and exhaustive report by the engineer, Señor Julius B. Figueroa, on a survey undertaken to fix the best positions for commercial ports on the maritime and fluvial shores of the province of Buenos Ayres. This duty was entrusted by the Provincial Government to Señor Figueroa in May, 1895; and he now presents the first part of his important task in a report consisting of text and atlas, on five ports on the sea-coast, namely, the bay of San Clemente, Mar Chiquita, Mar del Plata, Necochea, and the estuary of Bahia Blanca. The report comprises, for each of these ports, a survey with theodolite, tidal observations, character of the bottom, observations on winds, currents, and waves, and information as regards access from the interior, building materials, water-supply, and fishery. The atlas contains detailed plans of the ports and anchorages, with soundings and tidal diagrams. Señor Figueroa is a young engineer, a native of Peru. He performed his work in a small vessel of ten tons and a four-oared boat. He certainly deserves commendation alike for his arduous work in surveying and sounding, and for the thorough and exhaustive way in which he has prepared and illustrated his report.

The Exploration of Western Patagonia.—The explorations carried out during the last few years in Western Patagonia, both from the side of Chili and Argentina, have followed each other so rapidly, that but a small proportion of the vast material collected has yet been published. One of the most active explorers of the region to the east of the Andes is, as is well known, Dr. F. P. Moreno, whose work, carried out early in 1896, was briefly referred to in the *Journal* for that year (vol. viii. p. 518). In view of the interest which attaches to the region in question by reason of the boundary dispute between Chili and the Argentine Republic, Dr. Moreno has published a preliminary account † of the explorations of 1896, in order to give his countrymen a clearer view than had yet been gained of the general nature of their Patagonian territory at the base of the Andes, and its economic possibilities. The journey referred to was but one out of a long series extending over nearly twenty years, undertaken by Dr. Moreno both as a private individual and as director of the *Musée de la Plata*, the results of which are still largely unpublished, but it possesses a special interest in connection with current questions. The bulk of the volume is devoted to a narrative of the course of the expedition, with abundant descriptions of the physical features and scenery of the country traversed. In the fifth chapter, which deals with the region of Lake Nahuel-Huapi, the author borrows the description from the unpublished record of his journey in 1880, which contains also some useful notes on early explorers in that region. Dr. Moreno likens the scenery to that of Switzerland on a larger and more imposing scale, but with the difference due to the absence of signs of human activity. In the concluding chapter, after summing up the geographical work accomplished in 1896, he sketches the proposals which have been made to open up the country by means of railways, the points of departure for which, on the Atlantic coast, would be Puerto San Antonio, a little south of the Rio Negro, and Tilly Road, just north of 46° S. He points out three different lines which might with advantage be made from the former port, one of which would extend to Lake Nahuel-Huapi. The author speaks

---

* 'Estudios sobre puertos en la provincia de Buenos Ayres.' I. Parte. La Costa Maritima, por El Engeniero Julio B. Figueroa (*La Plata*, 1897) (Ministerio de Obras Publias) Texto y Atlas.

† 'Musée de la Plata. Notes Préliminaires sur une Excursion aux territories du Neuquen, Rio Negro Chubut et Santa Cruz, effectuée sous la direction de Francisco P. Moreno.' La Plata, 1898.

highly of the agricultural capabilities of the country, especially around the latter lake, and thinks that on being thrown open to colonization, tract of 500 miles in length would be rapidly peopled. The work contains a series of excellent photographic illustrations, and a large map embracing the Andine region between about 39° and 47° S. lat. Another recent work, which adds to our knowledge of Western Patagonia, is Dr. Steffen's * account of the exploration of the Rios Puelo and Manso in 1895–96, also well provided with maps and illustrations. In addition to the narrative of the journeys, it contains a clear sketch of the physical geography of the Rio Puelo region, and an account of the botanical geography of the Rio Manso. Six different botanical regions are distinguished between the Pacific coast and the continental water-parting, which, here as elsewhere, lies considerably to the east of the main ranges.

The Glaciers of North America—Erratum.—In the *Journal* for December, 1898, p. 554, first line, *for* 579 *read* 579,000.

AUSTRALASIA AND OCEANIC ISLANDS.

Journey in Dutch New Guinea.—In the tenth number of *Petermanns Mitteilungen* for 1898, Herr E. St. Vráz gives a short account of a journey made at the end of 1896 in the north-west peninsula of New Guinea, the scene of the journeys of D'Albertis and Beccari twenty years previously. Herr St. Vráz was able to make his way farther into the interior than those travellers, but the illness of himself and his porters, and the suspicion of the natives, put many difficulties in his way and prevented the full realization of his plans. Landing first at the group of villages generally (but erroneously, according to Herr St. Vráz) known as Dore, the spot at which Wallace resided for a few months in 1858, the traveller afterwards proceeded to the mouth of the little river Andaj, and set out thence across the Arfak range for the headquarters of the Hatam tribe. Beyond the range, there over 4000 feet high, Herr St. Vráz reached a plateau 1000 feet above the sea, but sparsely covered with vegetation as compared with the coast and the Arfak range, and after crossing two other high ridges with excessively steep sides, which reminded him of the ascent of the Andes from the Huallaga, reached the first village of the Hatam people. Here two earthquake shocks were experienced. On the 6th day after leaving the coast, the traveller looked down into a valley, named by him D'Albertis valley, in which lies the village of Great Hatam, which had not been reached by previous travellers. The inhabitants who dwell on the mountain slopes, 6500 feet high, on both sides of the valley, differed in language, ornaments, etc., both from the coast people and the Arfakese, and Herr St. Vráz considers them an aboriginal population driven back from the coast towards the interior. The separate hamlets, which rarely contain more than twenty scattered huts, are generally placed high up on steep slopes. Beyond a range to the west-south-west, named by the traveller Beccari range, the country seemed to be uninhabited. Having advanced 12 miles beyond Great Hatam, Herr St. Vráz was obliged to retrace his steps, owing to the ill success of his efforts to obtain porters or supplies for the journey to a lake, the shores of which were said to be inhabited by a tribe named Manikioan, beyond which the Hiraj (cannibals) were said to live. He gives some details respecting the customs, etc., of the Hatam people, some of their usages being identical with those of the Guahibos and other Indians of South America. He laments the poverty of animal life of the district, owing to the persecution, which not only the birds of

* 'Viajes i Estudios en la Rejion Hidrográfica del Rio Puelo.' Por Dr. Juan Steffen. Santiago, 1898.

Paradise, but every species of value, has experienced. For this reason his collections, the primary object of his journey, presented few novelties.

Tertiary elevated Limestone Reefs of Fiji.*—This subject is treated of by Dr. Alexander Agassiz in an article published in the *American Journal of Science* (4 ser., vol. vi. No. 32). A boring was started at Wailangilala island, in the atoll of the same name, and carried to a depth of 85 feet. For 40 feet coral sand was encountered similar to that forming the shores of the island; from that depth down to 85 feet, the core consisted of a limestone similar to the limestone composing the elevated reefs observed at Ngele Levu, Vanua Mbalavu, Mango, Yangasá, Oneata, Ongea, Kambara, Vatu Leile, and at different points along the eastern, southern, and western shores of Viti Levu. At some points the elevated limestones attain a height of over 1000 feet (Vatu Vara island, 1030 feet). The author points out that the Tertiary coralliferous limestones of Fiji have not played any part in the formation of the atolls or islands encircled by recent coral reefs, beyond forming the substratum upon which the recent corals have grown and established themselves as a comparatively thin crust. The underlying limestones have performed the same part as the volcanic substratum in other islands of Fiji. In both cases the platform upon the top of which the corals grow has been prepared by extensive submarine erosion.

POLAR REGIONS.

The Scientific Results of Nansen's Expedition.—We learn with pleasure that considerable progress has been made with the preparation, for publication, of the extensive scientific material collected during the voyage of the *Fram*, and that there is a likelihood that the first volume of memoirs will be issued during the coming summer or autumn. The collection will be in quarto form, and the separate memoirs will be the work of a number of specialists in the subjects treated of, each being paged separately. The total number will probably be about twenty, forming from three to five volumes. Those ready, or nearly ready, for the press include papers on the construction of the *Fram*, by Colin Archer; on the Jurassic fauna of Cape Flora, Franz Josef Land, by Dr. J. F. Pompeckj and Prof. A. G. Nathorst; on the ornithological results of the expedition, by Prof. R. Collett; and on the Crustacea collected, by Prof. O. G. Sars. Other important papers, not yet in so forward a state, will deal with different branches of marine zoology and botany, with the sediments of the ocean bottom, and the temperature and salinity of its waters at different depths; with the meteorological, magnetic, pendulum, and astronomical observations; with the formation and drift of the polar ice; while the geography of the north coast of Siberia will be illustrated by maps. Several of the papers will be by Dr. Nansen himself, while his collaborators include, besides those already mentioned, Prof. H. Mohn, Prof. Brögger, and others. The collection will be published at the expense of the Nansen Fund for the advancement of science.

The Voyage of the "Helgoland" round Spitsbergen.—At a meeting of the Berlin Geographical Society in November last, Captain Rüdiger, the commander of the *Helgoland*, gave an account of the German expedition which last summer visited the seas round Spitsbergen, and his paper is published in the *Verhandlungen* of the Society (1898, pp. 430 *et seq.*). The peculiarly favourable ice-conditions which prevailed during the latter part of July and the whole of August, while contributing to the success of the expedition, rendered navigation and geographical observation difficult by reason of the amount of fog caused by the evaporation from the open water; but, although the objects of the expedition were

* See *ante*, *Geographical Journal*, vol. xii., 1898, p. 525.

mainly zoological, some valuable geographical results were achieved, including many corrections of the delineation of the coasts of Spitsbergen. Leaving Tromsö on June 8, the voyagers sighted the southern end of Spitsbergen on the 16th, and made their way up Great Fiord, between Edge Land and West Spitsbergen. Heavy drift-ice was encountered, and, the passages leading to Olga strait being blocked, it was necessary to turn southwards and attempt to pass south of Edge Land. A great contrast was noticeable between the mountains of Spitsbergen, which, having their eastern slopes towards the voyagers, were entirely covered with snow and ice, and those of Edge Land, which, facing west, were already in great measure free from snow. The latter also differ in form, being generally table mountains. The existence of a tidal current in Walter Thymen strait was definitely proved, and it was also found that a current sets from Olga strait round the south end of Edge Land into Great Fiord, and thence round South Cape into the open sea to the west. It being found impossible to make a way through the ice into Olga strait, it was determined to first visit the west and north coasts of Spitsbergen, which proved to be in great measure free from ice. The *Helgoland* advanced as far as the Seven Islands, but there encountered thick fogs and drift-ice, which prevented the continuance of the voyage eastward. In Great bay—between North cape and Cape Platen—the voyagers enjoyed splendid weather, the thermometer registering 52·7° Fahr. at noon. Captain Rüdiger says that Capes Platen and Wrede are placed too far north and east on the maps, Cape Platen being more to the south than North cape. The passage of Hinlopen strait as far as Cape Torell was effected without any difficulty, but ice then compelled a return. Soundings in the strait revealed a depth of 260 fathoms, which has not hitherto been shown on the maps. Returning round the west coasts of Spitsbergen, the *Helgoland* again reached (July 22) the south point of Edge Land, and the sea to the north-east was found to be entirely open. A course was accordingly shaped for the south point of Swedish Forland, but after passing over the position occupied by this on the maps, it was discovered that the island extends only half as far southwards as has been previously supposed. Jena island (the principal unit of King Karl's Land group) was also found to be smaller, and to lie in a more northerly position, than is shown on the maps; but Mr. Pike's assertion that there is no more land to the east was confirmed. The small island to the north-east of Jena island proved to be an important breeding-place of the ivory gull. Steaming along the shore of North-east Land, which presented an unbroken field of ice, the *Helgoland* reached Great island, which, as has been previously conjectured, lies 10′ farther north than is shown on the maps. It was now determined to push on through the ice, and attempt the circumnavigation of North-east land, which had never previously been accomplished in this direction. Dense fog rendered navigation difficult and dangerous, but the ship at last emerged into open water near Charles XII. island. Advancing northwards from the Seven islands, the expedition reached the edge of the pack in 81° 32′ N., soundings taken *en route* showing a rapid deepening of the sea, until at last no bottom could be found at 630 fathoms. The return voyage was made through Hinlopen and Olga straits.

A New Andrée Search Expedition.—It is announced from Copenhagen that Captain Daniell Brunn intends next summer to organize an expedition to search for Andrée and his companions along the east coast of Greenland. He proposes to make his way from Iceland by Jan Mayen to the neighbourhood of Cape Barclay, in about 69° N. lat.

GENERAL.

The Seventh International Geographical Congress.—A second circular relating to the proposed work of the International Congress to meet this year at Berlin, has been issued by the Acting Committee. It contains a statement of the

subjects already offered for discussion, under the three heads: A. Papers, etc.; B. Propositions regarding unity of methods to be adopted by the different countries; C. Suggestions for joint international work. In view of the large number of subjects falling under the two latter heads, which will be brought before the Congress, it has been decided to appoint a scientific sub-committee for the examination of such propositions before they are embodied in the programme of the Congress. Those already submitted include propositions relating to the treatment of the problem of the tides, uniformity with regard to maps, the nomenclature of the oceans, etc., under the second heading; and for the joint collection of data respecting various geographical subjects, the exploration of the antarctic regions and of the oceans, the execution of the proposed map of the World and of a geographical bibliography, under the third. The Acting Committee call attention to the difficulty hitherto experienced in giving effect to resolutions of the Congress, and make an important suggestion with a view to a remedy. It is proposed that a Permanent International Committee shall be appointed to carry out, either alone or conjointly with the Bureau of the Congress, such measures as may be decided on at the general meeting, sub-committees being in each case entrusted with the practical work. Failing other means of providing funds, the governments of states might be applied to for financial assistance. The opinions and suggestions of members of the Congress on this subject are asked for, in order that a definite scheme may be laid before the Berlin meeting.

The Remains of Columbus.—After remaining undisturbed for hardly over a century, the remains of the great navigator have once more suffered removal, this time, it may be hoped, to their final resting-place. Transferred in 1509 from Valladolid to Seville, they were subsequently removed to San Domingo, only to be transferred to Cuba, on the cessation of Spanish rule in the former island. During the past hundred years they have remained at Havana, but since the Spanish evacuation of Cuba they have been brought back to Spain, arriving at Seville about the middle of January. After being landed from the despatch vessel *Giralda*, they were conveyed in state to the cathedral, the way being lined with troops, while salutes were fired and a requiem celebrated in the presence of an immense crowd.

Geographical Association.—The Annual Meeting of the Association was held on January 11, at the College of Preceptors, by permission of the Council, Mr. Douglas W. Freshfield, President of the Association, in the chair. The Annual Report, read by the Hon. Secretary, Mr. B. B. Dickinson (Rugby), gave evidence that the Association was growing steadily in numbers and influence. It stated that the Memorial to Boards of Public Examiners had been favourably received by the Central Welsh Board for Intermediate Education, and the answers from various examining bodies in Scotland expressed sympathy with the aims of the Association. In England the memorial was circulated two years ago, and has already led in several cases to a marked improvement in the character of the questions set. The question of a syllabus had been before the Committee for some years, and in December, 1897, two schemes of geographical work were drawn up and carefully considered by the Committee, who finally decided not to lend their authority to any syllabus, preferring to encourage individual teachers to explain in detail their own ideas of method, derived from practical experience. Several papers on the subject have since been published in the *Journal of School Geography* (New York), a monthly magazine which the Committee have done their best, during the past year, to make known to British teachers. Dr. A. J. Herbertson (Edinburgh) has been acting as Associate Editor for Great Britain, and various articles and notes by members of the Association have already appeared in its pages. Much, however, still remains to be done before the journal will meet the requirements of teachers

in this country, and the Committee appeal for help in the work to all who are interested in geographical education. Reference was made to lectures given by members of the Committee during the past year; but in this direction also there is need for increased activity, to keep pace with the growing interest in geographical subjects that is felt throughout the country. In conclusion, the Committee expressed their regret at losing the services of the Rev. J. Ll. Dove, who has been one of their number since the Association was founded in 1893. They also tendered their thanks to the Councils of the Royal Geographical Society, the Royal Scottish Geographical Society, the Royal Colonial Institute, and the British Association for their continued support. The Treasurer's report showed an expenditure of £63 5*s.* 2*d.*, and a balance of £14 6*s.* 9*d.* In moving the adoption of the Report, Mr. A. D. Carlisle (Haileybury) spoke of the value to teachers of the Association's collection of lantern slides, to which large additions are now being made, as well as of the *Journal of School Geography*. The motion was seconded by Mr. H. J. Mackinder (Oxford and Reading), who expressed his satisfaction at the refusal of the Committee to issue an authoritative syllabus, which, however useful at the moment, could not fail to do harm later on. It was of the utmost importance that the Association should be kept as active and efficient as possible, and its numbers increased, for after the present period of educational organization there would come a time when the public would take an interest in educational ideals and methods as distinguished from machinery, and then would come the opportunity of this Association. The officers and committee for the present year were proposed by Mr. E. P. Ash (Haileybury), and seconded by the Rev. Dr. Field (Radley). The President, Mr. Douglas W. Freshfield, then delivered a short address. He referred to the efforts made by the Council of the Royal Geographical Society from 1884 to improve the teaching of geography. But the Society was mainly concerned with travel and exploration; hence the need for such an association as this. With regard to the *Journal of School Geography*, he remarked that co-operation with the United States was both pleasant and fashionable; yet we ought to have a journal of our own. The Committee had done wisely in deciding not to adopt a syllabus, for uniformity was alien to the English mind, and all our great schools had their own traditions. It must be the work of the Association to convert the head masters, the high priests of the old system; and he was glad to see at least one head master present who needed no conversion. Physical geography had been long neglected; he hoped it would not now be made too prominent, for many diagrams covered with little arrows were discouraging to small boys. Nor must they turn their maps into Joseph's coats, the colours smothering the physical features. In the case of the continents and great European countries, it was a good plan to place the physical map in an atlas opposite the political, so that they could be readily compared. They should not slavishly copy foreign methods, but the field excursions, so much in vogue on the continent, followed by mapping and modelling, might in some form be introduced; or, if that were not practicable, the boys might be taken on ideal journeys by means of maps and lantern slides, physical geography being used to throw light upon the facts of history, the position of famous cities, and the movements of population. He regretted that the establishment of a geographical school in connection with one of the great educational centres in London seemed to be, for the moment, postponed; but they must lose no chance of pressing it. Meantime, although no final scheme had, he understood, been definitely adopted, there was good hope that at their next meeting they might be able to congratulate themselves on geography having been put in its proper place in the University of Oxford. A vote of thanks to the chairman was moved by Dr. H. R. Mill, and seconded by the Rev. J. Ll. Dove. An exhibition of slides, specially selected to

illustrate the use of the lantern in geographical teaching, was then given by Mr. A. W. Andrews, who in a few words indicated the special points that each slide was designed to illustrate.

Angelino Dalorto's Map of 1325.—A useful service to the history of cartography has been rendered by the publication, in facsimile, under the auspices of Prince Tommaso Corsini, owner of the original, of the map constructed in 1325 by the Italian cartographer, Angelino Dalorto. The reproduction of the map, which was presented to the Third Italian Geographical Congress held in connection with the centenary of Toscanelli and Vespucci, is accompanied by a short notice by Prof. A. Magnaghi, who had already given a short account of the cartographer in the *Revista Geografica Italiana* for 1897. He then considered the correct spelling of the name to be Dalorco, but recent researches of Prof. Marinelli and others have established Dalorto as more authentic. The family of that name was one of the most ancient of Genoa, and the names of its members frequently occur in the annals of the Italian commercial colony at Kaffa. The map is on parchment, measuring about 3½ feet by a little over 2. A legend at the side gives the name of the cartographer and the date, which has previously been misread as 1330. Although the information with regard to the coasts is particularly full and accurate, it does not seem to have been intended exclusively as a nautical chart, for the numerous data given with regard to the interior of the countries delineated entitle it to a place in the category of Mappamondi drawn to embody the state of accurate knowledge at the time with regard to the Earth. It includes the basin of the Mediterranean with the bordering countries, and a part of Northern and Western Europe. The cartographer keeps to the ancient conventional division of the continents, which he shows near the edge of the map by a circle divided into segments—the two western quadrants being occupied by Europe and Africa, and the eastern half by Asia. Explanatory notes define the extent of the three continents, Europe being held to terminate at the Don. In the representation of the interior of the land, Dalorto's map shows a great advance on those of his predecessors, and is one of the earliest maps in which attention is paid to the features both of the land and sea. As regards the coast-lines, the most remarkable advance is seen in the delineation of those of Northern Europe, in which Dalorto was long followed with little variation. Prof. Magnaghi calls attention to the most striking novelties to be seen in the map, and ends with the remark that it is one of the most precious cartographical relics of the Middle Ages. It is also of interest in connection with Baron Nordenskjöld's theory that the mediæval Portulani of the Mediterranean were all based on a type of *Catalan* origin. Prof. Marinelli adds a note upholding the claims of the Italian cartographers, and if, as Prof. Magnaghi holds, Dalorto was also the author of the Majorca map of 1339, usually known as that of Angelino Dulcert, the entire absence of examples of Catalan draughtsmanship previous to 1375 certainly seems to militate against Nordenskjöld's hypothesis.

Death of Victor Giraud.—The *Tour du Monde* (No. 49, 1898) records the death, on August 22 last, of Victor Giraud, the African explorer, which took place at Plombières, in the department of Vosges. The deceased traveller, who had only attained the age of forty years, was born at Morestel (Isère), and entered the French navy at an early age, being *enseigne de vaisseau* at the time of his well-known journey to the Central African Lakes (1882–84), the account of which he published in his work, 'Les Lacs de l'Afrique Equatoriale.' His most important achievement in this journey was the mapping—for the first time with any degree of accuracy—of Lake Bangweolo, the value of which has been fully shown by recent explorations. From the time of his return until his premature death, Giraud devoted himself to his professional duties.

Steamship Routes in the North Atlantic.—The rules framed by mutual agreement between the various Atlantic steamship companies for the better definition of the routes to be followed by westward and eastward bound vessels, came into force on January 15. From that date to August 14, west-bound vessels are to steer on a great circle course, but nothing south, so as to cross the meridian of 47° W. in lat. 42° N.; while from August 15 to January 14, the course must be shaped so as to cross 49° W. in 46° N., and 60° W. in 43° N. In either case they subsequently steer for a position south of Nantucket light-ship. East-bound ships must cross the meridian of 70° W., nothing to the northward of 40° 10′ N. at all times of year. From the intersection of those lines, a course is laid down which varies according to the time of year. From January 15 to August 23, the meridian of 47° W. is to be crossed in 41° N.; while from August 24 to January 14, the course passes the intersections of 60° W. with 42° N., and of 45° W. with 46° 30′ N. From the last positions in each case, nothing north of the great circle must be steered, whether bound to the Irish or English channels.

OBITUARY.

Captain Richard Trench Kirkpatrick, D.S.O.

The treacherous murder of Captain R. T. Kirkpatrick, D S.O., one of the officers attached to Major Macdonald's expedition in East Africa, deprives the British authorities in those parts of the services of a young officer of much promise, who had likewise done good work in the interest of geographical knowledge. From the scanty details which have so far been received, it seems that the scene of the murder was somewhat to the east of Dufile, whence the sad news was sent by Major Macdonald on December 17. The deceased officer had left the main body of the expedition for surveying purposes. Captain Kirkpatrick, who belonged to the Leinster regiment, obtained his commission as lieutenant in 1885, and his captaincy in 1893. He joined our Society in 1897, and, on proceeding to East Africa, obtained a grant of instruments for surveys in that region. His exploration of Lake Kioja is referred to in the last volume of the *Journal* (p. 521).

CORRESPONDENCE.

Sebastian Cabot, 1508.

Sebastian Cabot, the earliest recorded English arctic explorer, visited the ice-bound seas in the years 1508–1509. No account of this voyage, nor of any voyage by Cabot during these years, is given by his English biographers. The grounds upon which the opening statement is established are described in the following paragraphs. If the arguments therein set forth are consistent with historical fact and with logical reasoning, the result is a definite addition to what is known about the earliest English maritime explorations.

English sailors made frequent trading voyages to Iceland during the last half of the fifteenth century. Some of them had doubtless been blown northward and westward beyond their destination. A few of these storm-tossed and wind-driven vessels may have succeeded in making their way back from polar seas, but if so, the tales of their adventures have not been preserved in written history. Exploring expeditions, moreover, had sailed westward from Bristol as early as 1480, and in 1497 a crew of Bristol sailors, commanded by the father of Sebastian Cabot, succeeded in reaching the North American continent. But, so far as can be made

out from the available sources of information, the English voyage of 1508–9 was the first which deliberately sought a pathway through the unknown northern seas.

The career and the character of Sebastian Cabot have been studied with an amazing amount of well-intended energy during the past seventy years. Every scrap of information which concerns the man or his achievements have been examined with most exacting scrutiny. Laborious research has ransacked every storehouse wherein some chance might have hidden the least trifle of documentary information referring never so slightly to this subject. Whatever could be made to throw even the dimmest of side lights upon the world in which the Cabots lived, or upon the work which they did in it, has been utilized—from the galleys of Queen Hatshepsu to the latest charts of wind and tide and ocean currents. The students who have used these things, however, have been absorbed in contemplation of the fact that an Anglo-Venetian seaman may have set foot upon the continental soil of America a few weeks earlier than the Hispano-Genoese Columbus, or any other European of modern times. The definitive establishment of the fact that John, and not Sebastian, Cabot, in 1497, and not in 1494, planted an English banner on North America, was a notable historical performance. The proving of these facts required much wearisome research, careful and intelligent use of a confusing mass of material in many dialects, and a wide acquaintance with the literature and the characteristics of the period of discovery. It is now some years since the main facts of the Cabot discovery have been seriously questioned by well-informed and well-balanced students of that period. On the four-hundredth anniversary of the event, however, there was a sudden and remarkable revival of interest in everything connected with the discoverers. Books and many essays have been published, but it seems not to have occurred to the writers of these that there could be anything of real significance concealed in the known sources. The result has been that a great deal of time and of book-making has been expended upon the elucidation of facts which were already known quite as well, although not so widely, as they are to-day.

That the time is now ripe for some revision of the presuppositions which have hampered the students of Cabot, and for one addition to the stock of current information about him, seems to be shown by a remark in the latest volume devoted to the subject. Mr. Beazley, of Oxford, in his 'Builders of Greater Britain' volume, states in connection with one of the original accounts of Cabot's 1508 voyage that the story of this expedition "rests, to our thinking, on somewhat better foundation" than those of certain other voyages which some writers have supposed that Cabot made. Within the last half-dozen years, the story of this 1508 expedition has been partially related by two Italians. The erratic nature of many of the conclusions arrived at in the volume of one of these, however, and the evident desire of Sig. Tarducci to claim all honours for his hero, deprived his chapter upon this voyage of any convincing value. On the other hand, Dr. Errera, in the *Bollettino* of the Italian Geographical Society for August, 1893, presented certain facts which have been perfectly well known to all thorough students of the Cabots, in such a new arrangement as to make the voyage of 1508 seem quite possible. All of these facts, however, had previously been explained many times, with such different results, that no mere shuffling of them could be expected to change this possibility into an accepted historical probability. Moreover, the suggestions of Dr. Errera appear to be quite unknown to recent English writers upon the Cabots. Mr. Henry Harrisse probably represents the prevailing impression very fairly when, in his Cabot volume of 1896, p. 151, he describes one of the earliest distinct references to this voyage of 1508 as only "another example of the random talk noticeable in all the statements which originated with Sebastian Cabot."

The date of the voyage of 1508–9 is distinctly given by one of the best-known authorities for Cabot's English career, the writer whose works contain the earliest printed reference to him by name. Peter Martyr wrote his seventh decade, 'De Orbe Novo,' in 1524, and in the second chapter he mentions a voyage made by Cabot sixteen years before: "anno ab hinc sexto decimo ex Anglia." Unluckily, Richard Hakluyt corrected this statement, as he was entirely justified in doing according to his ideals of editorial duty, so that in the edition of the 'Decades' which he published in 1587, the edition which is almost invariably consulted by investigators, this passage reads, "Bacchalaos anno ab hinc vigesimo sexto ex Anglia per Cabotum repertos." Hakluyt's statement is the more nearly correct, according to what is now known regarding the Cabots' discovery of America. The important fact remains equally true, that Martyr, who knew Cabot intimately, associated his explorations with the year 1508.

This date is confirmed by a passage which was first made public by Sig. Berchet, in the monumental publication of the Italian Columbian Commission in 1893. Marc Antonio Contarini, in 1536, read to the Venetian Senate a report of his diplomatic mission to Spain, where he had enjoyed many opportunities of meeting Cabot. In this report, he states that Cabot made a voyage of exploration under the auspices of King Henry VII. of England, but that upon his return he found that his patron was dead, and that the son, Henry VIII., cared little for such enterprises. Henry VII. died on April 21, 1509.

The date of this voyage was comparatively widely known during the second half of the sixteenth century. In 1578, George Beste described a Cabot voyage of 1508, with considerable detail, in his 'Trve Discovrse of the late Voyage of Discoverie, for the finding of a passage to Cathaya by the North-vvest.' A year later, at Geneva, Vrbain Chauveton published a French translation of Benzons's 'New World,' to which he made extensive additions, including an account of Cabot's voyage, dated 1507, with details which were evidently not derived from Beste, nor yet from Ramusio's *Summario* of Peter Martyr, to which it apparently gives a reference. Chauveton's additions were translated into Latin and German for De Bry's edition of Benzoni, in his 'Grand Voyages,' part iv.

The more important details of this voyage are contained in the report, already mentioned, delivered to the Venetian Senate by Marc Antonio Contarini. The ambassador states that Cabot was authorized by Henry VII. to take two ships, and that "with three hundred men he sailed so far that he found the sea frozen, and he was compelled to return without having accomplished his object." As Mr. Harrisse has pointed out, this account agrees closely with an undated narrative printed in 1516 by Peter Martyr, and derived directly from Cabot, who was a frequent guest at Martyr's table. Martyr states that the northern seas had been searched by Sebastian Cabot, who fitted out two ships with three hundred men in England, and sailed northwards until he found immense icebergs and continual daylight in the month of July. He succeeded in making land, from which the sun had melted the snow. Compelled by the obstacles of nature to turn back, he coasted southwards, meeting immense shoals of large fish, whose countless masses actually stayed the progress of his vessels. Along the shores large bears were observed, which lay in wait for the fish, leaping into the shallow water as they saw their chance, and drawing the prey to land after much spattering and struggling. Another account of these fish and bears, much more realistic than that published by Martyr, is contained in the perplexing *Summario* of the 'Decades' and other earliest treatises on the 'New World,' which was printed in Venice in 1534. Curiously enough, this very significant narrative has never been used to any serious purpose by the biographers of Cabot, for what reason it would be hard to say.

Gomara in 1552, and Galvano in 1563, placed on record the main facts connected with this voyage, but without additional details, except the degree of north latitude reached, which is given as 58° or 60°. These facts are verified, also, to a certain extent by Richard Eden, whose intimacy with Cabot in his later years has been so often portrayed. In a comment on a translation of one of these narratives, Eden remarks that "Cabot touched only in the north corner and most barbarous parte" of the new world, "from whence he was repulsed with lse in the moneth of July."

Sebastian Cabot made another attempt, beside the voyage of 1508–9, to find a route through the northern seas. The details of this expedition cannot be made to coincide at any point with those already quoted. The most circumstantial account of this voyage is given by Ramusio, to whom had been entrusted, in 1551, an investigation into Cabot's Venetian interests. In the Discorso prefixed to the third volume of his 'Collection of Voyages,' published in 1553, Ramusio mentions a letter written to him by Cabot some time before, in regard to the probabilities for a worth-west passage from Europe to the East. Cabot wrote that he had once sailed for a long time west and north, until he reached lat. 67½° on June 11. The sea was still open before him, and there seemed to be nothing to prevent him from proceeding onwards toward Cathay, when he was forced to stop and turn back on account of some trouble with the shipmaster and mutinous sailors—"la malignità del padrone & de marinari solleuti."

There are two other accounts of an English voyage made at about this time, which was interfered with by a mutiny of the seamen. One is in the fascinating 'Interlude of the iiij Elements,' which, describing America, tells how—

> "But yet not longe a go
> Some men of this countrey went
> By the Kynges noble consent
> It for to serche to that extent
> And coude not be brought therto.
> But they that were the venteres
> Haue cause to curse their maryners
> Fals of promys and dissemblers
> That falsly them betrayed.
> Which wold take no paine to saile farther
> Than their own lyst and pleasure."

Richard Eden, of whose intercourse with Cabot we have such abundant traces, presented his translation of Munster's 'Treatyse of the Newe India' to the Duke of Northumberland. In the dedicatory epistle, Eden says that "manlye courage, if it had not been wanting in others, at suche tyme as oure sovereigne lorde of noble memorie King Henry the viij. about the same year of his rayne, furnished & set forth certen shippes under the gouernaunce of Sebastian Cabot, yet living, and one Syr Thomas Perte, whose faynt heart was the cause that that viage toke none effect." This passage closely suggests a remark made by Robert Thorne in a "book" or letter written about 1527, which is printed in Hakluyt's 'Divers Voyages.' Referring to some undertakings of the Bristol merchants, his father and Hugh Eliot, he says that "if the mariners woulde then haue been ruled, and folowed their pilots mind, the lands of the West Indies, from whence all the gold commeth, had been ours." In a marginal note, Hakluyt refers to Cabot's letter to Ramusio, which is quoted above.

No convincing indication of the date of this voyage has yet been discovered. Chauveton, as previously noted, tells of a voyage by Cabot to 67° north in 1507. The date 1517 would seem at first sight to be implied by Eden, were it not for the

fact that this writer was far too serious and too sensible a student to juggle with words in the fashion needed to obtain the eighth year of Henry VIII. There are many reasons for doubting the possibility of an English voyage having been made by Cabot in 1517, and Mr. Harrisse has devoted much skilful research to proving that Sir Thomas Perte or Spert could hardly have engaged in it at that time. Dr. Errera argues that in English, as in Italian, "the same year" of Henry VIII., in the absence of a direct reference to any other time, is obviously the first year of the reign. By this interpretation, the events of the mutinous voyage are combined with those of the iceberg expedition of 1508–9. An open sea at 67° north on June 11, and icebergs in July at 60°, are by no means mutually impossible. The two narratives are, however, so clearly distinguishable in all other respects, that it seems much safer to consider them as referring to separate adventures, and frankly to confess that there is no available means of determining the date of the June voyage to 67° north, unless we accept Chauveton's 1507, for which the most that can be said is that it has not been disproved.

Why has so little attention hitherto been paid to these two Cabot arctic voyages? In August, 1497, John Cabot and his English shipmates landed at Bristol, bringing the news that there were fertile lands awaiting Christian colonization on the western side of the Atlantic. Plans for the further exploration of this newly found land quickly took shape, and there is the best of evidence that five ships started thither early in the following year, 1498, equipped with everything that might be needed for the settlement of a colony and the exploitation of the country. Of the failure of this expedition—for in this case no news is probably not good news—absolutely nothing is known to-day. Not one word exists which has been proven to refer to the progress of the ships after they encountered a storm which forced one of them to return to the Irish coast. Perhaps it is one consequence of this absence of other information, that it has been the custom of writers upon the Cabot voyages to assume that the several narratives of arctic voyages, which have been quoted in previous paragraphs, contain the record of the progress of the expedition of 1498. The most painstaking examination of the original texts of these narratives, and of the context in which they properly belong, does not reveal the slightest ground for any such assumption.

It is not known whether Sebastian Cabot accompanied either of the expeditions of 1497 or 1498. After his father's death, according to the statements of men who knew him well, and whose good faith and historical competency in other matters are not questioned by those who have studied their writings most carefully, Sebastian became animated with a desire to emulate the achievements of Columbus. That source of winning the confidence and the support of those with whom he came in contact which characterized Sebastian Cabot so strikingly throughout his career, doubtless helped him at its very beginning to persuade King Henry VII. to authorize a trial of his ideas on navigation. In 1500, as in 1900, the thoughts of British merchants centred on the markets of Eastern Asia. Cabot, so far as we are able to understand his ideas, believed, and correctly, that the shortest route from England to Cathay lay across the arctic circle. He seems also to have had some notion of what is now called "great circle sailing," and this was probably the idea which he put on trial during the last year of his patron's life. Whether he had previously made a trial of the same theory, only to be thwarted by those with whom he sailed, is not now known.

Two facts must be explained before this hypothetical sketch of Sebastian Cabot's early career can claim the support of historical students. The first is, that the Drapers' Company of London in 1521 declared that a certain Sebastian—apparently referring to Cabot—had never visited the lands to which Henry VIII. was then

proposing to send him as pilot of an expedition. It is not probable that the lands upon which Henry VIII. and Cardinal Wolsey were thinking of expending men and treasure lay in the neighbourhood of those arctic regions which Cabot is supposed to have visited. Not one of the extant reports of his American exploration, for which Sebastian can be in any way held to be personally responsible, lays claim to acquaintance with any portion of the new world except the most northern regions.

The other fact is that, as has been persistently alleged, Sebastian Cabot throughout his life always confused his own arctic explorations with the discovery of the new-found land of Bacchalaos, and that he rarely, if ever, referred to the exploits of his father. There would be greater difficulty in refuting this allegation were it not for the actual fact that there are only two clear references to the discovery of 1497 which can be traced directly to Sebastian, and that each of these credits the discovery to his father. The mappemonde presumably made by Sebastian Cabot in 1544, and the Harford, pseudo-Holbein, portrait of the son, both state that John Cabot discovered North America. Each, at least by implication, leaves the impression on the reader that the son participated in that discovery. There exists not the slightest ground upon which to base an absolute denial of the truth of this last statement.

As for the other accounts, Sebastian must have talked with many people many times about his early English experiences. His hearers were mainly interested in two things—the discovery of Baccalaos, or the codfish country, which was first visited by a European within the period of modern history, when John Cabot touched its shores in 1497; and in Sebastian's tales of his own seafaring. Some of his listeners repeated his stories, and we know that their words were retold to others. Small wonder that confusion crept into the narrative; that the father who had died a half-century before was forgotten in the son, whose courteous, intelligent earnestness made him friends among the stolid Englishmen as among the mercurial Spaniards; and that the events of voyages accomplished many decades earlier mingled together to form a single narrative. Conversation rarely fixes any fact clearly in the mind; it leaves many impressions which are true, but which are quite as easily recalled, as every lawyer knows, in false as in their true associations. This, however, is not a place for the discussion of historical evidence, or of the character of Sebastian Cabot. It is not out of place, however, to suggest that the historical sources which detail the story of the Cabots, are in no wise different from those which relate to other men, living or dead, and that the rules of historical criticism which need to be applied in their elucidation are the same as are used in other investigations. Recent developments in the Cabotian controversies make it necessary to preserve in their discussion, with rather more than usual care, the spirit of fair play and honest open-mindedness, and to employ a certain amount of common sense—and very little else.

GEORGE PARKER WINSHIP.

Providence, R.I., November 30, 1898.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Austria.

Hydrographischer Dienst in Österreich. Jahrbuch des k. k. hydrographischen Central-Bureaus. IV. Jahrgang 1896. Wien: W. Braumüller, 1898. Size 15 × 11. *Maps and Diagrams.*

Statistics, diagrams, and maps of rainfall, snowfall, and river-levels in the drainage areas of all the rivers of the Austrian crown-lands separately, and a general section giving the necessary explanations and general statistics.

Balkan States. **Miller.**

Travels and Politics in the Near East. By William Miller. London: T. Fisher Unwin, 1898. Size 9½ × 6½, pp. xxiv. and 516. *Map and Illustrations. Price* 21*s.*

This book records the journeys of a careful, observant, and well-instructed traveller through the greater part of the Balkan peninsula. Chapters are devoted to Istria and Dalmatia, Montenegro, Bosnia and Herzegovina, Novibazar, the Albanian coast and Corfu, Greece, Crete, Samos, Macedonia, Constantinople, and Bulgaria. There are excellent illustrations, including a striking view of the Corinth canal. A reprint of Kiepert's map of the Balkan peninsula (uncoloured), on the scale of 1: 1,500,000, is reproduced by permission, but neither the name of the author nor of the German publisher, Dietrich Reimer, is mentioned upon it.

France—Mont Blanc. **Mathews.**

The Annals of Mont Blanc. A Monograph. By Charles Edward Mathews. With a Chapter on the Geology of the Mountain, by Prof. T. G. Bonney. London: T. Fisher Unwin, 1898. Size 9 × 6, pp. xxiv. and 368. *Map and Illustrations. Price* 21*s. Presented by the Publisher.*

This important history of the ascents of Mont Blanc is accompanied by a chapter on the geology of Mont Blanc by Prof. Bonney, and a bibliography of the mountain arranged alphabetically according to authors' names. The appendix includes a table of all the ascents from 1786 to 1851, a table of fatal accidents from 1820 to 1898—these number 19—and a facsimile reprint of an interesting 'Account of the Glacières or Ice Alps in Savoy,' presented to the Royal Society in 1744.

Italy. **Corcelle.**

Turin et la Vallée d'Aoste. Par J. Corcelle. (Extrait de la *Revue de Géographie*, Octobre 1898.) Size 10 × 6½, pp. 8. *Presented by the Author.*

Italy. **Magistris.**

Giovanni Marinelli. Le Provincie d'Italia. Brevi cenni geografici, statistici e storici per lo studio della geografia patria nelle scuole elementari secondo i

programmi 29 novembre 1894. Provincia di Aquila degli Abruzzi di Luigi Filippo de Magi-tris. Roma: Società Editrice Dante Alighieri, 1898. Size 8 × 5½, pp. (each) 24. *Presented by the Author.*

Italy—Graian Alps. *Jahrb. Schweizer Alpenclub* **33** (1897-98): 101-148. **Euringer.**

Die Grajischen Alpen. Zweiter Teil. Bergfahrten in Piemont. Von Gustav Euringer. *With Plates.*

Italy—Lago di Garda. *Riv. G. Italiana* **5** (1898): 365-377. **Fischer.**

L'anfiteatro morenico del Lago di Garda. Del Prof. Dott. Teobaldo Fischer.

Russia. *B.A. Imp. Sci. St. Pétersbourg* **8** (1898): 77-84. **Dubinsky.**

Détermination des éléments du magnétisme terrestre à Kamenets-Podolsk, Khotine et Odessa en automne 1895. Par W. Dubinsky. [In Russian.] *With Plate.*

Russia. *Mém. Comité Géolog. Russ.* **16** (1898): 1-362. **Stuckenberg.**

Allgemeine geologische Karte von Russland. Blatt 127. Von A. Stuckenberg. [In Russian.] *With Plates.*

This report is in Russian, with a comprehensive abstract in German.

Russia. *G.Z.* **4** (1898): 556-573. **Gotz.**

Die Industriegebiete des östlichen und nördlichen Russlands. Von Wilh. Götz.

Russia. *J. Franklin I.* **146** (1898): 193-214, 264-279. **Kunz.**

A Trip to Russia and the Ural Mountains. By George F. Kunz.

Russia—Cyclones. *B.A. Imp. Sci. St. Pétersbourg* **7** (1897): 481-485. **Rybkin.**

Die Cyclonenbahnen in Russland in den Jahren 1890-92. Vorläufige Mittheilung. Von P. Rybkin.

Notes on the paths of 344 cyclones which pursued a well-marked path across European Russia.

Russia—Geology. **Nikitin.**

Bibliothèque Géologique de la Russie. 1896. Composée sous la rédaction de S. Nikitin. Supplément au tome xvi. des Bulletins du Comité Géologique. St. Petersburg: Eggers & Cie., 1897. Size 10 × 7, pp. 244.

This book is printed in Russian, with a French translation of each title and brief summary of works dealing with the geology of Russia.

Russia—Kursk. *Mém. [Zap.] S. Imp. Russe G.* **32** (1898): 1-24. **Moureaux.**

Déterminations magnétiques faites en Russie dans le Gouvernement de Koursk sous les auspices de la Société Impériale Russe de Géographie en 1896. Par M. Th. Moureaux. *With Maps.*

Russia—North Coast. *Petermanns M.* **44** (1898): 230-231. **Shokalsky.**

Die Arbeiten der Russischen Kriegsmarine in den arktischen Gewässern im Jahre 1896. Mitteilung von J. v. Schokalski. *With Map.*

A summary of the work by Colonel Shokalsky, of which a translation appeared in the *Journal* for August, 1898 (vol. xii. p. 172).

Switzerland. *B.S.G. Lille* **30** (1898): 129-148. **Maquet.**

La Haute-Engadine et le massif de la Bernina. Par M. Maurice Maquet. *With Illustrations.*

Switzerland—Bern. *XVI. Jahresb. G. Ges. Bern* 1897 (1898): 261-266. **Schmid.**

Die Temperaturverhältnisse in der Aare bei Bern. Von Emil Schmid.

The temperature of the water of the Aar has been observed three times daily since 1895, and the results for three years are briefly discussed.

Switzerland—Bernese Alps. **Gallet.**

Jahrb. Schweizer Alpenclub **33** (1897-98): 173-191.

Quelques chemins inédits dans les Alpes bernoises. Par Julien Gallet. *With Plates.*

Switzerland—Davos. *Jahrb. Schweizer Alpenclub* **33** (1897-98): 262-291. **Schibler.**

Ueber die nivale Flora der Landschaft Davos. Von Dr. Wilh. Schibler. *With Plates.*

On the high mountain flora of the Davos region.

Switzerland—Geodesy. **Messerschmitt.**

Internationale Erdmessung. Das Schweizerische Dreiecknetz herausgegeben von der Schweizerischen geodätischen Kommission. Achter Band. Lotabweichungen

in der mittleren und nördlichen Schweiz. Im Auftrage ausgeführt und bearbeitet von Dr. J. B. Messerschmitt. Zürich: Fäsi & Beer, 1898. Size 12½ × 9, pp. vi. and 204. *Plate.*

On the geodetic results of the Swiss triangulation.

Switzerland—Rhone Glacier. *C. Rd.* **127** (1898): 572-574. **Forel.**

Circulation des eaux dans le glacier du Rhône. Note de M. F. A. Forel.

United Kingdom. *J. of T. Victoria I. (London)* **30** (1898): 305-323. **Hull.**

Further investigations regarding the Submerged Terraces and River Valleys bordering the British Isles. By Prof. Edward Hull, LL.D., F.R.S. *With Chart.*

United Kingdom. *Nineteenth Century* **44** (1898): 840-853. **Paley.**

The Roman Roads of Britain. By W. B. Paley. *With Map.*

United Kindom—Agriculture. *P. Philosoph. S. Glasgow* **29** (1898): 1-21. **Smart.**

The Report of the Royal Commission on Agricultural Depression. By William Smart, M.A.

United Kingdom—Emigration and Immigration. ———

Copy of Statistical Tables relating to Emigration and Immigration from and into the United Kingdom in the year 1897, and Report to the Board of Trade thereon. London: Eyre & Spottiswoode, 1898. Size 13 × 8½, pp. 62. *Price* 6*d.*

In 1897 the number of passengers leaving British ports was 782,430, and those arriving, 742,114—a balance of 40,316 outwards, which is a smaller number than for several previous years. The British and Irish emigrants numbered 146,460. Tables of the emigration for previous years and of the emigration from the separate ports are also given.

United Kingdom—England—Derbyshire. ———

Report by the Board of Agriculture upon an Application for a Provisional Order for the Regulation of Wolstanton Marsh, Staffordshire. London: Eyre & Spottiswoode, 1898. Size 13½ × 8½, pp. 4. *Price* ½*d.*

United Kingdom—England. **Fairley.**

On the Water Supplies of Yorkshire. By Thomas Fairley. Reprinted from the *Journal of the Federated Institutes of Brewing*, vol. iv., No. 5, May, 1898. Size 8½ × 5½, pp. 393-406. *Map. Presented by the Author.*

The water available for supplying towns in Yorkshire is here classified according to the amount of dissolved salts it contains, the smallest quantity of total salts noted is 4·16 grains per gallon at Pickering, the largest—not a mineral water—is 48·9 near Middlesbrough.

United Kingdom—England. **Mossman.**

Quarterly J.R. Meteorolog. S. **24** (1898): 238-249.

On the Frequency of Non-Instrumental Meteorological Phenomena in London with different winds from 1763-1897. By R. C. Mossman.

The discussion shows that snow comes most frequently with north and east winds, hail with west and north-west winds, strong gales from west or south, summer thunderstorms most often from quarters between east and south or else west, dense fog almost always with east wind, and auroras usually with south or west winds.

United Kingdom—England. **Bosworth.**

Philips' County Readers, Essex Past and Present. By George F. Bosworth. London: G. Philip & Son, 1898. Size 7½ × 4½, pp. x. and 240. *Maps and Illustrations. Price* 2*s. Presented by the Publishers.*

This little book gives a series of extracts and descriptions by many writers, illustrated by an orographical and a geological map and various pictures, which together give a good popular idea of the individuality of Essex as a geographical and historical unit.

United Kingdom—England. *J. School G.* **2** (1898): 291-297. **Mill.**

The English Lake District. By Dr. H. R. Mill.

United Kingdom—Ireland. *Natural Sci.* **13** (1898): 243-252. **Fitzpatrick.**

The Eskers of Ireland. (Part ii.) By Thos. Fitzpatrick, LL.D.

United Kingdom—Meteorology. **Scott.**

Quarterly J. R. Meteorolog. S. **24** (1898): 217–228.

The frequency of Rainy Days in the British Islands. By Robert H. Scott, M.A., F.R.S. *With Maps.*

The largest number of rainy days for the ten years 1886–1895 was found to be 72 per cent. for Stornoway, and nearly as much for stations in the west of Ireland and Shetland. Less than 50 per cent. of the days brought rain over the south-east of Scotland and the centre of England over a roughly rectangular area, with Chester and the Humber on the north, and the coast from Torquay to Dover on the south. The smallest rain-frequency reported was 39 per cent. at Bude, in Cornwall, but this must be explained by peculiar local conditions.

White Sea. *B.A. Imp. Sci. St. Petersbourg* **7** (1897): 269–301. **Knipovich.**

Matériaux concernant l'hydrologie de la Mer Blanche et de la Mer Mourmane I. Par N. Knipovitch. [In Russian.]

ASIA.

China. **Bretschneider.**

History of European Botanical Discoveries in China. By E. Bretschneider, M.D. 2 vols. London: Low & Co., 1898. Size 11 × 8, pp. xvi. and 1168. *Presented by the Author.*

Dr. Bretschneider has planned this important work in such a way as to present a history of scientific exploration and observations in China, although the subjects dealt with are the plants and vegetable products only. The arrangement is chronological, commencing with the journeys of Marco Polo, but becoming detailed and important with the work of the Jesuit missionaries of the sixteenth century, and from the beginning of the nineteenth century, detailing the results of every expedition or traveller. The latest data refer to 1898. There is an admirable index of species.

India—Nepal. *Imp. and Asiatic Quarterly Rev.* **7** (1899): 64–82. **Parker.**

Nepaul and China. By E. H. Parker.

On the former relations existing between Nepal and the Chinese empire, treated historically, and of the wars between the Chinese and Ghurkas, largely from Chinese sources. The author asks for the co-operation of any one knowing many place-names in Nepal, or possessing a good map of it, in order to continue with more result his studies of the Chinese records.

Japan. **Diósy.**

The New Far East. By Arthur Diósy. With Twelve Illustrations from special designs by Kubota Beisen, of Tōkio, a Reproduction of a Cartoon designed by H.M. the German Emperor, and a specially drawn Map. London: Cassell & Co., 1898. Size 9 × 6, pp. xvi. and 374. *Price* 16s.

Malay Archipelago—Borneo. **Agamennone.**

Atti R.A. Lincei, Rendiconti **7** (1898): 155–162.

I terremoti nell' isola di Labuan (Borneo) del 21 settembre 1897. Nota di G. Agamennone.

On the earthquake at Labuan on September 21, 1897.

Malay Archipelago—Natuna Island. **Hassett and Schwartz.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **15** (1898): 21, 154, 444, 657.

De Poelau Toedjoeh in het zuidelijk gedeelte der Chinesche Zee. Door A. L. van Hassett en H. J. E. F. Schwartz. *With Map and Illustrations.*

Malay Archipelago—Philippines. **Brinton.**

The Peoples of the Philippines. By Daniel G. Brinton, M.D. Reprinted from the *American Anthropologist*, October, 1898. Washington, 1898. Size 10 × 6½, pp. [16]. *Map and Illustrations. Presented by the Author.*

Malay Peninsula—Pahang. **Clifford.**

Annual Report of the State of Pahang for the year 1897. By Hugh Clifford. Kuala Lumpur, 1897. Size 13½ × 8½, pp. 36. *Presented by the Author.*

Malay Peninsula—Perak. **Rodger.**

Perak Administration Report for the year 1897. By J. P. Rodger. Taiping. Size 13½ × 8½, pp. 54.

Persia. *J. Manchester G.S.* **14** (1898): 176–189. **Wells.**

Caravan Routes and Road Making in Persia. By Lieut.-Colonel Henry Lake Wells. *With Map.*

Philippine Islands. *Deutsche Rundschau G.* **21** (1898): 1–12. **Le Monnier.**

Der Archipel der Philippinen. Von Dr. Franz Ritter v. Le Monnier. *With Map and Illustration.*

Philippine Islands—Manila. **Stevens.**

Yesterdays in the Philippines. By Joseph Earle Stevens. London: Low & Co., 1898. Size 8 × 5¼, pp. xx. and 232. *Map and Illustrations. Price 7s. 6d. Presented by the Publishers.*

A popularly written sketch of life in Manila, by the representative of the one American firm which existed there before the war.

Russia—Caucasus. *Blackwood's Mag.* **164** (1898): 524–541. **Simpson.**

Travel Pictures in the Caucasus. By J. Y. Simpson.

Russia and Persia. **Radde.**

Wissenschaftliche Ergebnisse der im Jahre 1886 allerhöchst befohlenen Expedition nach Transkaspien und Nord-Chorassan. Von Dr. G. Radde.—Dr. A. Petermanns Mitteilungen Ergänzungsheft Nr. 126. Gotha: Justus Perthes, 1898. Size 11 × 8, pp. 196. *Map.*

This is the full report of a number of journeys carried out in the Trans-Caspian territory and in northern Khorasan between 1881 and 1886 by Dr. Radde and J. M. Konshin, and contains an immense amount of information as to the topography, geology, and physical geography of the region.

Russia—Siberia. *Globus* **74** (1898): 287–291. **Fedoroff and Kondratovich.**

Eine Ob-Expedition während des Sommers 1895. Nach G. G. Fedorow und O. W. Kondratowitsch.

Russia—Siberia. *Rev. G.* **42** (1898): 199, 266; **43** (1898): 99, 180. **Radlinski.**

Les peuplades du nord-est de l'Asie. Par I. Radlinski.

Russia—Siberia.

Le Transsibérien et les Excursions en Train de Luxe organisées par la Cie Internationale des Wagons-lits et des grands Express Européens. Paris: Imp. Lahure. Size 6½ × 10, pp. 28. *Map and Illustrations.*

Russia—Siberia. *Globus* **74** (1898): 193–194. **Pech.**

Kap "Deshnew," bisher "Ostkap," und sein Entdecker. Von T. Pech.

The Russian Emperor having decreed on June 18 (30), 1898, that East Cape, the easternmost promontory of Asia, should henceforth be called Cape Deshneff, in honour of its discoverer, the paper recalls the circumstances of the original journey in 1648.

Russian Central Asia. **Perowne.**

Russian Hosts and English Guests in Central Asia. By J. T. Woolrych Perowne. London: The Scientific Press, 1898. Size 9 × 6, pp. xvi. and 198. *Map and Illustrations. Price 7s. 6d. Presented by the Publishers.*

The author in his preface states that he has in this book "purposely avoided any attempt to make a volume that should bring up to date our knowledge of the geographical, commercial, or political aspect of the countries" he visited. The journey is described as one of great comfort and enjoyment, and the illustrations are characteristic and numerous. The route followed was that of the Trans-Caucasus and Trans-Caspian railways, from Batum to Samarcand, with trips thence into Ferghana and to Tashkent. The spelling of place-names and transliterations from Russian do not follow a uniform system.

Siam. **Beckett.**

Trade of Chiengmai and District for the year 1897. Foreign Office, Annual No. 2192, 1898. Size 10 × 6½, pp. 16. *Price 1d.*

Turkey—Anatolia. **Diest.**

Von Tilsit nach Angora. Forschungsreise zweier preussischen Stabsoffiziere im Frühjahr 1896. Von Walther v. Diest.—Dr. A. Pettermanns Mitteilungen. Ergänzungsheft Nr. 125. Gotha: Justus Perthes, 1898. Size 11 × 7½, pp. 98. *Maps.*

Turkey—Asia Minor. *Sitz. k. Preussische A. W. Berlin* (1898): 531–555. **Judeich.**

Bericht über eine Reise im nordwestlichen Kleinasien. Von Prof. Dr. Walther Judeich. *With Illustrations.*

Turkey—Palestine. **Hanauer.**

Palestine Exploration Fund, Quarterly Statement (1898): 244–246.

Tell er Reesh, etc. By Rev. J. E. Hanauer. *With Map.*

On a hill in the neighbourhood of Jaffa.

Turkey—Palestine. **Schick.**

Palestine Exploration Fund, Quarterly Statement (1898): 224–229.

Birket es Sultan, Jerusalem. By Dr. Conrad Schick. *With Plan and Section.*

Turkey—Palestine. **Schick.**

Palestine Exploration Fund, Quarterly Statement (1898): 232–238.

Hebron and its Neighbourhood. By Dr. Conrad Schick. *With Plan.*

Turkey—Palestine and Syria. **Baedeker.**

Palestine and Syria. Handbook for Travellers, edited by Karl Baedeker. With 20 Maps, 48 Plans, and a Panorama of Jerusalem. Third Edition. Leipsic: Karl Baedeker; London: Dulau & Co., 1898. Size 6½ × 4½, pp. cxviii. and 472. *Price* 12 *marks. Presented by Messrs. Dulau & Co.*

This handbook is written by Dr. Albert Socin, and revised from the recent journeys of Dr. Immanuel Benzinger.

AFRICA.

Congo State. **Burrows.**

The Land of the Pigmies. By Captain Guy Burrows. With Introduction by H. M. Stanley, M.P. London: C. Arthur Pearson, Ltd., 1898. Size 9 × 6, pp. xxx. and 300. *Portrait and Illustrations. Price* 21*s. Presented by the Publishers.*

Mr. Stanley, in his preface, pays a tribute to the Belgian administration of the Congo State. Captain Burrows relates his journeys and observations in the Welle district, in some parts of which he was the first European to set foot. The King of the Belgians adds a letter apparently addressed to "the agents of the Congo Free State," but not dated. There are numerous illustrations, some of them remarkably interesting, but neither maps nor index. The spelling of place-names is unusual.

Marocco. **Schnell and Bernard.**

Publication de l'École des Lettres d'Alger. Bulletin de Correspondance Africaine. L'Atlas Marocain d'après les documents originaux. Par Paul Schnell. Traduit . . . par Augustin Bernard. Paris: E. Leroux, 1898. Size 10 × 7, pp. x. and 316. *Map. Presented by M. A. Bernard.*

M. Augustin Bernard, professor of African geography in the École supérieure des Lettres in Algiers, has translated the valuable monograph compiled by Dr. Paul Schnell, and published as an Ergänzungsheft of *Petermanns Mitteilungen* in 1892; the text of the translation having been revised by the author, who has brought the work down to date, the translator assisting in this task. The result will be to ensure an enlarged circle of readers for a most deserving work.

Tripoli. *Deutsche G. Blätter* **21** (1898): 88–110. **Grothe.**

Tripolitanien und der Karawanenhandel nach dem Sudan. Von Dr. L. H. Grothe.

Tripoli. *G.Z.* **4** (1898): 537–556. **Grothe.**

Tripolitanien und seine Zukunft als Wirtschaftsgebiet. Von Dr. L. H. Grothe. *With Plates.*

A summary of the geography of Tripoli based on a residence of two years in different parts of the territory, concluding with a statement of the belief that Germany is the European nation called upon to open up Tripoli to civilization and trade.

Tunisia. **Bruun.**

The Cave Dwellers of Southern Tunisia. Recollections of a Sojourn with the Khalifa of Matmata. Translated from the Danish of Daniel Bruun, by L. A. E. B. London: W. Thacker & Co., 1898. Size 9½ × 6, pp. xii. and 336. *Illustrations. Price* 12*s. Presented by the Publishers.*

This is the record of a journey in the interior of Tunisia for the collection of ethnographical specimens for the museum in Copenhagen, principally from the cave-dwelling Berbers of the south. A French summary appears in the *Tour du Monde* 4 (1898): 481–492.

West Africa. *M. Deutsch. Schutzgebieten* **11** (1898): 177–183. **Besser.**

Bericht über die Expedition zur Festsetzung der deutsch-englischen Grenze zwischen dem Niger Coast Protectorate und der deutschen Kolonie von Kamerun. Von Premierlieutenant v. Besser. *With Map.*

An account of the Anglo-German frontier between Kamerun and the Niger territory, with a map on the scale of 1 : 150,000 of the district between the Rio del Rey and Cross river. On pp. 191–194, Dr. R. Kiepert and Herr M. Moisel give notes on the compilation of this map, and a list of the material they employed.

West Africa. **Freeman.**

Travels and Life in Ashanti and Jaman. By Richard Austin Freeman. London: A. Constable & Co., 1898. Size 10 × 7, pp. xx. and 560. *Maps and Illustrations. Price* 21*s.*

This book describes a journey from the Gold Coast through Ashanti, and a residence in Bontuku before it had been assigned to the French sphere. In addition to the account of the journey with various natural history notes, there are two chapters on the history and present state of Ashanti, one on malaria—the author is a medical man—and one on the commercial outlook. Dr. Freeman has already contributed an important paper on the same subject to the Society. See *Supplementary Papers*, vol. iii.

Western Sudan. *Imp. and Asiatic Quarterly Rev.* **6** (1898): 322–341. **Lobb.**

British Influence in the Western Soudan: its History and Results. By R. Popham Lobb.

NORTH AMERICA.

Bermuda. **Stark.**

Stark's Illustrated Bermuda Guide: containing a description of everything on or about these places of which the Visitor or Resident may desire information, including their History, Inhabitants, Climate, Agriculture, Geology, Government, and Resources. By James H. Stark. Boston: J. H. Stark; London: Low & Co. 1897. Size 8 × 5¼, pp. viii. and 154. *Maps, Plan, and Illustrations. Price* 6*s.*

North America—Glaciers. **Russell.**

Glaciers of North America. A Reading Lesson for Students of Geography and Geology. By Israel C. Russell. Boston, U.S.A.: Ginn & Co., 1897. Size 9½ × 6½, pp. x. and 210. *Maps and Illustrations. Price* 6*s.*

An introductory chapter treats of glacial phenomena in general; the glaciers of the Sierra Nevada, of Northern California and the Cascade Mountains, of the Canadian Rockies, of Alaska, and of Greenland are then successively considered, and several concluding chapters deal with the theory of glaciers.

United States. *J. School G.* **2** (1898): 281–291. **Gilbert.**

Origin of the Physical Features of the United States. By G. K. Gilbert. *With Map.*

United States. *National G. Mag.* **9** (1898): 377–386. **McGee.**

The Growth of the United States. By W. J. McGee.

United States—California. *J. Geology* **6** (1898): 551–576. **Fairbanks.**

Geology of a portion of the Southern Coast Ranges. By H. W. Fairbanks. *With Illustrations.*

United States—Colorado. *National G. Mag.* **9** (1898): 431–434. **Newell.**

Mesa Verde. By F. H. Newell.

United States—Maine. **Keating.**

Agriculture of the State of Maine. Foreign Office, Miscellaneous, No. 480, 1898. Size 9½ × 6½, pp. 10. *Price* 1*d.*

United States—Massachusetts. *J. Geology* **6** (1898): 463–472. **Jefferson.**

The Post-glacial Connecticut at Turner's Falls, Mass. By M. S. W. Jefferson. *With Illustrations.*

A history of recent river-evolution.

United States—Meteorology. ——

U.S. Department of Agriculture. Report of the Chief of the Weather Bureau, 1896–97. Washington: Government Printing Office. 1897. Size 12 × 9, pp. x. and 432. *Maps and Diagrams. Presented by the Weather Bureau.*

This report deals in detail with the climatology of the United States, and in particular with the distribution of rainfall over the country and the floods of the Mississippi river.

United States—North Carolina. **Sikes.**

Johns Hopkins University Studies in Historical and Political Science. The Transition of North Carolina from Colony to Commonwealth. By Enoch Walter Sikes, PH.D. Baltimore, 1898. Size 10 × 6½ pp. 84.

United States—Washington. *National G. Mag.* **9** (1898): 417–428. **Gannett.**

Lake Chelan. By Henry Gannett. *With Map and Illustrations.*

Description of a narrow winding lake in the State of Washington, the length being nearly 50 miles, while the breadth averages little over one mile.

United States and Mexico. *National G. Mag.* **9** (1898): 345–371. **McGee.**

Papagueria. By W. J. McGee. *With Illustrations.*

CENTRAL AND SOUTH AMERICA.

British Guiana. **Rodway and Stark.**

Stark's Guide-Book and History of British Guiana: containing a description of everything relating to this colony that would be of interest to Tourists and Residents, respecting its History, Inhabitants, Climate, Agriculture, Geology, Gold-mining, Government, and Resources. By James Rodway and James H. Stark. Boston: J. H. Stark; London: Low & Co. [Not dated.] Size 8 × 5¼, pp. 120. *Maps and Illustrations. Price* 6*s.*

Chaco Region. **Brinton.**

The Linguistic Cartography of the Chaco Region. By Daniel G. Brinton, M.D., etc. (Read before the American Philosophical Society, October 8, 1898.) Philadelphia, 1898. Size 9½ × 6, pp. 30. *Map. Presented by the Author.*

A study of the tribes of the Gran Chaco region, including parts of several contiguous countries, with a map showing the distribution of the chief languages, the relations of which are complicated, and have given rise to much difference of opinion.

South America. *J. School G.* **2** (1898): 241–248, 297–311. **Ward**

Climatic Notes made during a voyage around South America. By R. De C. Ward.

South America—Indiarubber. *Deutsche Rundschau G.* **20** (1898): 381–491. ———

Capital und Arbeit in den Kautschukdistricten von Süd-Amerika.

Uruguay. **Grenfell.**

Trade of Uruguay for the year 1897. Foreign Office, Annual No. 2097, 1898. Size 10 × 6½, pp. 14. *Price* 1*d.*

Venezuela. **Brinton.**

The Dwarf Tribe of the Upper Amazon. By Daniel G. Brinton, M.D. Reprinted from the *American Anthropologist*, September, 1898. Washington, 1898. Size 10 × 6½, pp. [4.] *Presented by the Author.*

Criticizes the belief in a pygmy people existing in the forests of Venezuela.

Venezuela. *Scottish G. Mag.* **14** (1898): 591–599. **Paterson.**

In the Wilds of Venezuela. By Major Stanley Paterson. *With Illustrations.*

A journey up the Cuchivero river.

Venezuela. *Globus* **74** (1898): 163–165, 291–294, 302–307. **Sievers.**

Die Inseln von der Nordküste von Venezuela. Nach den bisherigen Quellen und unter Berücksichtigung des Tagebuches und der Gesteins-Sammlung Richard Ludwigs. Dargestellt von W. Sievers.

West Indies—Barbados. **Franks and Harrison.**

Quarterly J. Geolog. S. **54** (1898): 540–555.

The *Globigerina*-marls [and basal Reef-rocks] of Barbados. By G. F. Franks and Prof. J. B. Harrison. With an Appendix on the Foraminifera, by F. Chapman. *With Sketch-map and Sections.*

West Indies—Curaçoa. **Jesurun.**

Trade of Curaçoa for the year 1897. Foreign Office, Annual No. 2047, 1898. Size 10 × 6, pp. 22. *Price* 1½*d.*

West Indies—Dominica. **Naftel.**

Report on the Agricultural Capabilities of Dominica. By C. O. Naftel. Colonial Reports, Miscellaneous, No. 9, 1898. Size 10 × 6, pp. 72. *Map. Price* 9½*d.*

West Indies—Grenada. **Broadway.**

Report on Agriculture in Carriacou. Colonial Reports, Miscellaneous, No. 11, 1898. Size 10 × 6, pp. 18. *Price* 1½*d.*

West Indies—Jamaica. **Blake.**

Jamaica. Annual Report for 1896–97. Colonial Reports, Annual No. 225, 1898. Size 10 × 6, pp. 52. *Price* 3*d.*

West Indies—St. Vincent. **Thompson.**

St. Vincent. Annual Report for 1897. Colonial Reports, Annual No. 233, 1898. Size 10 × 6½, pp. 14. *Price* 1*d.*

West Indies—Trinidad. **Knollys and Low.**

Trinidad and Tobago. Annual Report for 1897. Colonial Reports, Annual No. 241, 1898. Size 10 × 6½, pp. 28. *Price* 2*d.*

AUSTRALASIA AND PACIFIC ISLANDS.

German New Guinea. **Lauterbach, Danckelman, and Cohn.**

Z. Ges. Erdk. Berlin **33** (1898): 141–182.

Die geographischen Ergebnisse der Kaiser Wilhelms-Land-Expedition. Von Dr. C. Lauterbach. *With Maps.*

Die Ergebnisse der barometrischen Höhenmessungen und meteorologischen Beobachtungen der Kaiser Wilhelms-Land-Expedition von 1896. Von Dr. von Danckelman.

Astronomische Ortsbestimmungen der Kaiser Wilhelms-Land-Expedition. Berechnet von Dr. Fritz Cohn.

This is noticed in the *Journal* for December, 1898, p. 617.

Hawaii. **Kenny.**

Trade of the Hawaiian Islands for the year 1897. Foreign Office, Annual No. 2193, 1898. Size 10 × 6½, pp. 12. *Price* 1*d.*

During 1897 the imports to Hawaii came in the following proportions: from the United States, 76·94 per cent.; from the United Kingdom and British possessions, 11·85 per cent.; and the rest (11·21 per cent.) distributed equally between Germany, China, Japan, and other countries. All the exports went to the United States.

New Zealand—Gold Dredging. **Jacquet.**

New South Wales. Department of Mines and Agriculture. Geological Survey. Mineral Resources. No. 3. Notes on Gold Dredging, with reference to the Introduction of the Industry into New South Wales. By J. B. Jacquet. Sydney, 1898. Size 9½ × 6½, pp. 22. *Map and Plates. Price* 1*s.* 6*d.*

Queensland. *T.R.G.S. Australasia* (*Victoria*) **15** (1898): 24–32. **Le Souëf.**

Ascent of Mount Peter Botte, North Queensland. By Dudley Le Souëf. *With Illustration.*

South Australia. **Lindsay and Winnecke.**

South Australia. Reports on Tablelands, Northern Territory. By D. Lindsay and C. Winnecke. Adelaide, 1898. Size 13½ × 9, pp. 4. *Presented by the Colonial Office.*

Western Australia. ——

Western Australia. Report of the Department of Mines for the year 1897. Perth, 1898. Size 13½ × 8½, pp. 210. *Plan and Diagram. Presented by the Department of Mines, Western Australia.*

A diagram showing the quarterly output of gold for Western Australia brings out in a striking way the fact that, while 1250 ounces were raised in 1887, no less than 225,000 ounces were produced in the last quarter of 1897. The report gives in detail the official data for the output of each goldfield.

Western Australia. **Chambers.**

A Land of Promise: Western Australia in 1897-98. By Trant Chambers. Second Edition. Perth, 1898. Size 8½ × 5½, pp. 140. *Map and Illustrations.*

Western Australia—Geological Survey. ——

Western Australia. Annual Progress Report of the Geological Survey for the year 1897. Perth, 1898. Size 13 × 8½, pp. 66. *Maps and Plans. Presented by the Geological Survey of Western Australia.*

This report contains, amongst others, a large-scale geological map of the Coolgardie district.

POLAR REGIONS.

Antarctic Exploration. *Nautical Mag.* **67** (1898): 217–220. ——

Antarctic Exploration. By "Zero."

Arctic Pilot. **Penn.**

The Arctic Pilot. Volume i. Sailing directions for the Barents, Kara and White seas. Compiled . . . by Commander H. S. Penn, R.N. London: J. D. Potter, 1898. Size 9½ × 6, pp. xxxiv. and 352. *Index Charts. Price* 6*s. Presented by the Hydrographic Office, Admiralty.*

The importance of navigation in the Arctic Sea is shown by the fact that the old 'White Sea Pilot' has been recast and extended to include navigation to the mouth of the Yenesei and the coast of Novaya Zemlya.

Greenland. *Ann. G.* **7** (1898): 441–456. **Zimmermann.**

Le régime glaciaire au Groenland; d'après un ouvrage recent. Par M. Maurice Zimmermann. *With Illustrations.*

A review of Drygalski's great work.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Land and Water. **Beythien.**

Eine neue Bestimmung des Pols der Landhalbkugel. Von Dr. Phil. Hermann Beythien. Kiel und Leipzig: Lipsius & Tischer, 1898. Size 10 × 6½, pp. 30. *Maps. Presented by the Author.*

Land Forms. *J. Geology* **6** (1898): 704–710. **Iddings.**

Bysmaliths. By Joseph P. Iddings.

The author points out that, while an intruded sheet of igneous rock is flat, a laccolith is a mass of igneous rock intruded amongst sedimentary strata so as to elevate them into a dome, and a bysmalith is a more abrupt plug of intruded igneous rock, like, but not to be confounded with, a stock or volcanic neck.

Physical Geography. *National G. Mag.* **9** (1898): 435–447. **McGee.**

The Geospheres. By W. J. McGee.

Mr. McGee recognizes four geospheres—the atmosphere, hydrosphere, lithosphere, and centrosphere. He points out how the interactions between these affect geographical conditions.

Physical Geography. *J.G. Tokyo G.S.* **10** (1898): 215–225. **Yazu.**

On the Definition of Physical Geography. By Masanaga Yazu. [In Japanese.]

Rain and Rivers. *B.A. Imp. Sci. St.-Pétersbourg* **7** (1897): 375–381. **Gravelius.**

Vorläufige Mittheilung über einige Ergebnisse der Anwendung einer Methode des Herrn Rykatschew zum Studium des Zusammenhangs zwischen Niederschlag und Wasserstand. Von Dr. Harry Gravelius.

Seismology. **Milne.**

Seismology. By John Milne, F.R.S. London: Kegan Paul & Co., 1898. Size 7½ × 5½, pp. xvi. and 320. *Illustrations. Price 5s. Presented by the Publishers.*

Seismometry. *Sitzb. k. A.W. Wien* **106**, Abth. IIa. (1897): 551–561. **Pfaundler.**

Ueber einen Erdbeben-Registrator mit elektrisch-photographischer Aufzeichnung des Zeitmomentes des Stosses. Von L. Pfaundler.

Terrestrial Magnetism. *Terrestrial Magnetism* **3** (1898): 93–134. ——

The International Conference on Terrestrial Magnetism and Atmospheric Electricity. *With Diagrams.*

Terrestrial Magnetism. *P.A. Imp. Sci. St.-Pétersbourg* **8** (1898): 191–205. **Wild.**

Ueber die Einrichtung erdmagnetischer Observatorien. Von H. Wild. *With Plan.*

Tides. **Darwin.**

The Tides and Kindred Phenomena in the Solar System. The substance of lectures delivered in 1897 at the Lowell Institute, Boston, Massachusetts. By George Howard Darwin. London: John Murray, 1898. Size 8 × 5½, pp. 18 and 342. *Illustrations. Price 7s. 7d. Presented by the Publisher.*

Zoogeography. *Science* **8** (1898): 615–618. **Miller.**

An Instance of Local Temperature Control of the Distribution of Mammals. By Gerrit S. Miller, Jr.

This is a case of an "island" of low temperature due to local causes resulting in the establishment of a boreal fauna far to the south of their proper habitat.

BIOGRAPHY.

Reveillère. *Deutsche Rundschau G.* **21** (1898): 84–85. ——

Contreadmiral P. E. M. Reveillère. *With Portrait.*

Schaffter. *XVI. Jahresb. G. Ges. Bern*, 1897 (1898): 59–63. **Ducommun.**

Albert Schaffter et la Société de Géographie de Berne. Par M. Elie Ducommun.

The subject of this biography was born in 1823, founded the Bern Geographical Society in 1873, and died in 1897.

Schefer. **Cordier.**

Charles Schefer, Membre de l'Institut. Par Henri Cordier. Paris, 1898. Size 8½ × 6, pp. xvi. *Presented by the Author.*

Thoroddsen. *Globus* **74** (1898): 161–163. **Lehmann-Filhés.**

Dr. Thorvaldur Thoroddsen. Von M. Lehmann-Filhés. *With Portrait.*

Waghorn. *Imp. and Asiatic Quarterly Rev.* **6** (1898): 386–395. **Waghorn.**

The Pioneer of the short and rapid route to India and the East. By Agnes E. Waghorn.

Wakefield. *Blackwood's Mag.* **164** (1898): 821–828. ——

A Maker of Colonies.

A sketch of the life and work of Edward Gibbon Wakefield (1796–1862), who was a pioneer in colonial enterprise in the first half of the century.

GENERAL.

Educational—Text-book. **Loffler.**

Omrids af Geographien nærmest udarbejdet til brug ved forelæsninger. Af Dr. E. Løffler. 2 vols. (in 1). Kjøbenhavn: Lehmann & Stages, 1893 and 1898. Size 9½ × 6½, pp. (vol. i.) 532; (vol. ii.) 348. *Presented by the Author.*

A Danish treatise on geography, with a short general introduction and more detailed descriptions of each continent; the section on Europe being that more recently published. The method of treatment is based on geological and physical structure, and there are some excellent illustrative sketch-maps.

Geographical Discovery. **Jacobs.**

The Story of Geographical Discovery. How the World became known. By Joseph Jacobs. With Twenty-four Maps, etc. London: G. Newnes, Ltd., 1899 [1898]. Size 6½ × 4, pp. 224. *Price* 1*s.* *Presented by the Publishers.*

This little volume contains a compact and carefully arranged summary of the history of discovery, written in a very popular style, and likely to interest the general reader and call attention to an aspect of geography which has been much and undeservedly neglected. A condensed table, "The Annals of Discovery," gives the dates of the more important explorations in all parts of the world. There are references to more advanced histories, and several interesting illustrations.

Oriental Collections. **Cordier.**

La Collection Charles Schefer. Par Henri Cordier. Paris: *Gazette des Beaux-Arts*, 1898. Size 11½ × 8, pp. 20. *Illustrations.*

Pacific Powers. *Nineteenth Century* **44** (1898): 656–672. **Taylor.**

The Coming Struggle in the Pacific. By Benjamin Taylor.

Place Names. *A travers le Monde, Tour du Monde* **4** (1898): 307–308. **Maison.**

Une explication de l'étymologie de Londres. Par Émile Maison.

Place-Names. *T.R.S. Literature* **20** (1898): 37–104. **Phené.**

Place-Names in and around Rome, Latium, Etruria, Britain, etc., with Earthworks and other Works of Art illustrating such Names. By Dr. Phené. *With Illustrations.*

Dr. Phené discusses the similarity of certain ancient serpentine roads and other structures in Italy and Britain, and deduces conclusions as to place-names supported by a wealth of archæological references.

Russian Hydrographic Publications. ——

Catalogue of Atlases, Charts, Plans, Views, Albums of Flags, Navigation Guides, etc. Corrected to March 1, 1898. Published by the Chief of the Hydrographic Department, Ministry of Marine. [In Russian.] St. Petersburg, 1898. Size 9½ × 6½, pp. iv. and 128.

Travell-rs' Equipment. **Brown.**

The Equipment of Exploring Expeditions. A paper read before the Institution of Mining Engineers. By M. Walton Brown. General Meeting at London, May 20, 1898. Excerpt from the *Transactions of the Institution of Mining Engineers.* London and Newcastle-upon-Tyne: A. Reid & Co., 1898. Size 10 × 6½, pp. 12. *Presented by the Secretary of the Institution.*

A practical man's advice as to the most convenient appliances for use on exploring expeditions.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

ARCTIC REGIONS.

Spitsbergen. **Kjellström and Hamberg.**

Karta öfver Kung Karls Land upprättad under 1898 års svenska polarexpedition af C. J. O. Kjellström och A. Hamberg. Scale 1 : 200,000 or 2·9 stat. mile to an inch. *Presented by Dr. Nathorst.*

This is a reduction of the survey, made during last summer, by Lieut. C. J. O. Kjellström and Dr. A. Hamburg, who accompanied Dr. A. G. Nathorst's Swedish arctic expedition.

EUROPE.

England and Wales. **Ordnance Survey.**

Publications issued since December 8, 1898.

1-inch—General Maps:—

ENGLAND AND WALES:—83, 200, hills engraved in black or brown; 70, 104, 116, 132, 144, 160, 174, 175, 183, 189, 190, 191, 198, 265, 296 (revision) engraved in outline; 250, 253, 276, 279, 292, 305, 306, 349, 351 (revision), hills engraved in black or brown. 1*s. each.*

6-inch—County Maps:—

ENGLAND AND WALES (revision):—**Derbyshire,** 11 N.W. **Durham,** 1 S.E., 3 N.E., 4 N.W., 8 S.E., 10 S.E., 16 N.E., 17 N.E., 22 N.E., 31 N.E., S.E., 32 S.W., 33 S.W., 37 N.E., S.E., 39 N.W., S.E., 40 N.W., S.E., 41 N.W., N.E., S.E., 42 S.W., S.E., 43 S.W., 45 S.W., S.E., 45A N.W., 46 N.E., S.E., 47 N.E., 48 N.W., S.E., 49 N.W., N.E., S.E., 50 N.W., S.W., 56 N.W. **Hertfordshire,** 40 N.W., N.E., 41 N.W. **Middlesex,** 1 N.W., N.E., 2 N.W., 25 S.E. **Essex,** 19 N.W., 22 N.W., 30 S.E., 31 N.E., 39 S.W., 48A N.W., 49 N.W., 56 N.E., S.E., 64 N.E., S.W., S.E., 72 N.E., 72A. N.W., 72 S.E., 86 N.E., 88 N.E. **Northumberland,** 55 S.W., 58 N.W., N.E., 89 S.W. **Sussex,** 13 S.E., 34 S.W. **Surrey,** 1 S.E., 3 N.W., N.E., S.W., S.E., 6 N.E., 8 S.E., 10 N.W., 12 N.E., 22 N.E., 30 N.W., S.E., 37 N.E., S.E., 42 S.W., 45 S.E., 47 N.W. **Hampshire,** 28 S.E., 36 N.E., S.E., 37 S.W., 46 S.E., 54 N.E., 55 N.E., 62 N.W., N.E., 70 NW., 75 S.E., 78 N.W., S.W., 79 S.E., 81 N.W., N.E., S.W., 82 N.W., 84 N.W., 87 N.W., 88 N.W., S.W., S.E., 89 N.W., S.E., 90 N.W., 91 S.W., S.E., 93 N.E., 94 N.W., N.E., S.W., 95 S.W., S.E., 96 S.W., S.E., 97 N.W., N.E., S.E., 98 N.W., N.E., S.W., 99 S.W., 100 N.W., N.E. **Kent,** 4 N.E., 5 N.W., N.E., 7 S.W., 9 N.W., 13 S.W., 15 S.E., 22 N.E., 24 N.W., N.E., S.W., S.E., 33 N.W., 34 S.W., 35 N.E., 36 S.W., 47 N.W., S.W., 49 N.W., 55 N.E., S.W., 56 N.W., 57 N.W., S.W., 65 N.W., S.E., 66 N.E., S.W., 67 N.W., N.E, S.W., S.E. 1*s. each.*

25-inch—Parish Maps:—

ENGLAND AND WALES (revision):—**Berkshire,** VIII. 16; XVI. 2, 6, 10; XXII. 6, 10; XXIII. 5, 10, 11, 15; XXX. 3; **Bucks.,** XXXIII. 13, 14, 15; XXXVI. 1, 8; XXXVII. 1, 2, 3, 4, 5, 6, 8, 10, 11, 12, 14, 15; XXXVIII. 5, 9, 13; XL. 16; XLI. 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 16; XLII. 1; XLVII. 11; XLVIII. 1, 6, 10; LI. 5, 10, 11. **Cheshire,** XXII. 6; XXIII. 6, 9, 16; XXIV. 6, 8, 10, 11, 12, 14; XXX. 3; XXXI. 4, 6, 7, 8, 10, 11; XXXII. 1, 4, 6, 10; XXXIV. 5, 9; XXXIX. 2, 3, 4, 6, 10, 14, 15; XLVI. 7, 8, 10; LVI. 7; LIX. 8; LX. 1, 2, 7, 9, 13; LXIV. 3. **Cumberland,** LXXXV. 7, 14; LXXXVI. 14; LXXXVII. 7, 12; LXXXVIII. 2, 5, 9, 10, 11, 13, 14; XC. 1, 5, 7. **Derbyshire,** I. 15; II. 3, 7, 10, 11, 13, 14; V. 1, 13; VIII. 3; XIV. 3, 7, 11; XVIII. 10, 14, 15, 16; XX. 13; XXXII. 13, 14, 15, 16; XXIII. 16; XXIV. 13, 14, 16; XXV. 2, 5, 10, 11, 12, 13, 14, 15, 16; XXVIII. 1, 2, 3, 4, 5, 6, 8; XXIX. 1, 2, 3, 4, 6, 7, 9, 11, 12; XXX. 1, 4; XXXIA. 1. **Glamorganshire,** II. 3; III. 12; VII. 15; XIV. 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15; XXIII. 1, 5, 6, 9, 10, 13, 14; XXXII. 1, 2, 5 and 9. **Hertfordshire,** XXV. 16; **Kent,** XLVI. 3; XLVIII. 4, 8; LXVIIIA. 1; LXIX. 6, 10, 11; LXIXA. 3; LXXXVI. 4. **Northumberland,** III. 10, 14; IV. 9. **Notts.,** XIII. 13, 15; XVIII. 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16; XXIII. 1, 3, 6, 11, 12. **Oxfordshire,** XXXVA. 13; XL. 3, 4, 6, 8, 11, 12; XLI. 1, 2, 7, 8, 10, 14; XLII. 1, 5; XLVII. 4, 16; XLVIII. 2, 6; XLIX. 2, 16; L. 13; LII. 4, 6, 7, 8, 10, 11, 12; LIII. 5, 9, 12, 15; LIV. 5; LVI. 1, 6, 7, 8. 10, 11, 12. **Staffordshire,** II. 13, 14. **Sussex,** VII. 10, 13, 16; XVII. 3, 4, 11; XVIII. 1, 2, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15; XIX. 1, 9; XXIX. 1, 2, 3, 6, 7, 8, 12, 14, 15, 16; XXX. 4; XXXI. 9; XLIII. 1, 2, 5, 6, 9, 10,

11, 12; XLIV. 8, 11, 12, 14, 15, 16; XLV. 3, 9, 10, 11; XLVI. 10, 11. **Westmorland**, V. 7, 10, 11, 13, 14, 15; VIII. 4, 8, 12, 16; IX. 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13; X. 9, 13; XIV. 4; XV. 1, 2, 4, 5, 6, 7; XVI. 8, 15, 16. *3s. each.*

(*E. Stanford, Agent.*)

Austria-Hungary. **Artaria.**

Artaria's Eisenbahn- und Post-Communications-Karte von Oesterreich-Ungarn, 1899. Scale 1 : 1,700,000 or 18·8 stat. miles to an inch. Mit Stationsverzeichnis. Verlag von Artaria & Co., Wien. *Price* 1 *fl.*

England. **Bartholomew.**

Plan of Manchester and Salford. Scale 300 yards to an inch. By J. Bartholomew, F.R.G.S. London: W. H. Smith & Sons, 1898. *Presented by Messrs. J. Bartholomew & Co. Price 2s.*

Europe. **International Geological Congress.**

Carte géologique internationale de l'Europe. 49 feuilles à l'echelle de 1 : 1,500,000 or 23·6 stat. miles to an inch. Livraison III., contenant les feuilles A. III., A. IV., B. III., B. IV., C. V., D. V., D. VI. La Carte, votée au Congrés géologique international de Bologne en 1881, est exécutée conformément aux décisions d'une Commission internationales avec le concours des Gouvernements, sous la direction de MM. Beyrich et Hauchecorne. Berlin: Dietrich Reimer, 1898. *Presented by the Royal Society.*

This is Part III. of the geological map of Europe, which is in course of publication in conformity with a resolution passed by the International Geological Congress of 1881. The maps of the present issue contain the British Isles and the north coast of France, the Alps and Northern Italy, Austria-Hungary, the Balkan Peninsula, and the southern extremity of Italy. This important map will be completed in forty-nine sheets, of which eighteen are now published.

Germany. **Königl. Preuss. Landes-Aufnahme.**

Karte des Deutschen Reiches. Herausgegeben von der Kartogr. Abtheilung der Konigl. Preuss. Landes-Aufnahme, 1898. Sheets: 281, Bentheim; 298, Meseritz; 327, Cleve; 357, Paderborn. Scale 1 : 100,000 or 1·7 stat. mile to an inch. *Price* 1.50 *marks each sheet.*

Historical Atlas. **Poole.**

Historical Atlas of Modern Europe, from the Decline of the Roman Empire; comprising also maps of parts of Asia and of the New World, connected with European History. Edited by Reginald Lane Poole, M.A., PH.D., Fellow of Magdalen College, and Lecturer in Diplomatic in the University of Oxford. Part XXI. Oxford: The Clarendon Press; London, Edinburgh, Glasgow, and New York; Henry Frowde, M.A.; Edinburgh: W. & A. K. Johnston. 1898. *Price* 3*s.* 6*d. each part. Presented by the Clarendon Press.*

This part contains—Map 52, The Netherlands, by Dr. Julius Fredericha; map 74, South-Eastern Europe and Asia Minor, c. 1210, by Prof. J. B. Bury, M.A., LITT. D.; map 86, European Colonies and Dependencies after the Peace of Utrecht (1713), by Hugh E. Egerton, M.A. Each of these maps is accompanied by explanatory letterpress.

Russia. **Antropoff.**

Financial and Statistical Atlas of Russia. E. A. Antropoff, St. Petersburg, 1898. *Price* 13*s.* 6*d.*

This is a financial and statistical atlas of European Russia, containing numerous maps and diagrams illustrating the different subjects dealt with. The letterpress is in Russian.

ASIA.

Asia Minor. **Friedrich.**

(1) Handels- und Produktenkarte von Kleinasian, bearbeitet von Dr. Ernst Friedrich. Scale 1 : 2,500,000 or 39·7 stat. miles to an inch. (2) Uebersichtskarte von Kleinasian, bearbeitet von Dr. Ernst Friedrich. Scale 1 : 2,500,000 or 39·7 stat. miles to an inch. Halle a. S. Verlag von. G. Sternkopf, 1898. *Presented by the Publisher.*

Indian Government Surveys. **Surveyor-General of India.**

Indian Atlas, 4 miles to an inch, Sheets: 89, parts of districts Mirzapur and Jubbulpur, Rewah (Native State), Sirgujah, Korea, etc. (Gahrját States), of Chota Nagpur Division, Meyhar, etc. (Native States), of Bundelkhand and districts Banda and Allahabad, additions to 1898; 106, part of district Sambalpur and Garhját States, of Raigarh, Sonpur, Rarakhol, and Bamra (Central Provinces), and Band, Athmallik, and Angul (Orissa Tributary States), additions to 1893. Quarter Sheets:

31 N.W., parts of districts Ferozepore, Montgomery, Lahore, and of Native States Bahâwalpur (Punjab), and Bickaneer (Rajputana), additions to 1896; 52 N.E., parts of districts Sangor (Central Provinces) and Jhánsi (North-West Provinces), and Native States of Gwalior (Central India Agency), Tonk, and Jhallawar (Rajputana Agency), additions to 1896; 66 S.E., parts of districts Naini Tal, Almora, and Garhwál (North-West Provinces), and of Nepal, additions to 1896; 90 N.W., parts of districts Mandla and Biláspur (Central Provinces), Native States of Rewah (Central India Agency) and Chang Bhakár of Garhját States (Bengal), additions to 1896.—India, showing railways, 80 miles to an inch, May, 1898.—Central Provinces Survey, scale 1 inch to a mile: No. 35, parts of districts Betúl, Chhindwára and Hashangabad (Central Provinces), Seasons 1863-65; and 1867-69: No. 50, parts of districts Hoshangabad, Chhindwára, and Narsinghpur (Central Provinces), Seasons 1862-64 and 1868-69.—Hyderabad Survey, 1 inch to a mile: No. 168, parts of Bhongir, Golconda, and Medak Circars (Nizam's Dominions), Seasons 1827-28 and 1829-30.—South-Eastern Frontier, 4 miles to an inch: 1 N.W., 4th edition, parts of districts North and South Lushai Hills and Native States of Manipur (Assam), Hill Tippera (Bengal), and Chin Hills (Upper Burma), Seasons 1853 to 1894; 1 N.E., 6th edition, parts of districts Upper Chindwin, Katha, and Shwebo (Upper Burma), and of Manipur Native State (Assam), Seasons 1886-94, 5 N.W.; 5th edition, parts of districts Mandalay, Sagain, Meiktila, and Kyaukse, and of the Shan States (Upper Burma), Seasons 1889-92.—Sind Survey, 1 inch to a mile: Nos. 1 and 2 (in one), district Karachi, Season 1895-96; No. 15, district Karachi, Season 1895-96.—Central India and Rajputana Survey, 1 inch to a mile: No. 304, parts of states Gwalior, Indore, and Dewás (Central India Agency), Seasons 1877-78; No. 381, parts of Gwalior (Central India Agency) and of Dholpur (Rajputana Agency), Seasons 1861-63.—Upper Burma Survey, 1 inch to a mile: No. 260 (Preliminary edition), parts of Mandalay district, Season 1896-97; 306 (2nd edition), parts of Mandalay district and Northern and Southern Shan States, Seasons 1895-97; No. 359 (preliminary edition), parts of Southern Shan States, Season 1894-95.—Provinces of Bengal, Bihár, Orissa, and Chota Nagpur, 32 miles to an inch, July, 1898.—Bengal, Bihar, Orissa, and Chota Nagpur, 16 miles to an inch, 1898 (2nd edition).—Karenni Boundaries, Upper Burma, 4 miles to an inch, 1898.—District Chánda (Central Provinces), 16 miles to an inch, 1898.—District Ferozepore (Punjab), 8 miles to an inch, 1898.—District Hissar (Punjab), 8 miles to an inch, 1898.—District Monghyr (Bengal), 8 miles to an inch, 1890.—District Rájsháhi (Bengal), 8 miles to an inch, corrected to 1878.—District Nadia (Lower Provinces, Bengal), 4 miles to an inch, 1898.—Chart of Triangulation, Madras Forest Survey, Madura district, 2 miles to an inch, Season 1886-93, 3 sheets.—Index to the Standard Sheets of the Punjab, corrected to 1898. *Presented by H.M. Secretary of State for India, through the India Office.*

Malay Peninsula. **Straits Branch of the Royal Asiatic Society.**

Map of the Malay Peninsula. Scale 1: 506,880 or 8 stat. miles to an inch. Straits Branch of the Royal Asiatic Society, 1898. E. Stanford, London. 6 sheets. *Price* 12*s*.

This map supersedes those of the Malay Peninsula which have previously been published for the Straits Branch of the Royal Asiatic Society. In its compilation all the most recent and reliable material has been used, and the boundaries between the different states and territories are distinguished, those defined by survey being shown in a different manner from those which are undefined. All means of communication are laid down, and the localities where minerals are found are indicated. At the foot of the map there is a synopsis of native towns which will be useful.

AFRICA.

Africa. **Bartholomew.**

Bartholomew's Political Map of Africa. Scale 1: 12,000,000 or 189 stat. miles to an inch. J. Bartholomew & Co., Edinburgh, 1899. *Price* 3*s*., *mounted on cloth. Presented by the Publishers.*

This is a new edition of this well-known and useful map.

Central and South Africa. **Bartholomew.**

Central and South Africa. By J. G. Bartholomew, F.R.G.S. Scale 1: 5,600,000 or 88 stat. miles to an inch. J. Bartholomew & Co., Edinburgh, 1899. *Price* 3*s*., *mounted on cloth. Presented by the Publishers.*

The present edition of this map has been brought up to date. It contains a considerable amount of detail, and is drawn on a sufficiently large scale to be very useful for the purpose of general reference.

Witwatersrand Goldfields. **Wood and Ortlepp.**

Map of the Witwatersrand Goldfields. Scale 2500 feet to an inch. J. Wood & A. Ortlepp. Published by the Universal Publishing Co., Ltd., London, 1898. *Presented by the Universal Publishing Co., Ltd.*

Persons interested in the Witwatersrand gold-mining industry will find this a useful map for reference. It is drawn on the scale of about half a mile to an inch, and is compiled from official surveys.

GENERAL

World. **Johnston.**

The World-Wide Atlas of Modern Geography, Political and Physical. Containing 128 plates and complete index. With an introduction by J. Scott Keltie, LL.D., etc. Fourth edition. W. & A. K. Johnston, Edinburgh and London, 1898. *Presented by the Publishers. Price 7s. 6d.*

World. **Andree.**

Andrees allgemeiner Handatlas, 126 Haupt- und 139 Nebenkarten auf 186 Kartenseiten, nebst alphabetischem Namenverzeichnis. Vierte, völlig neubearbeitete, stark vermehrte Auflage, herausgegeben von A. Scobel.—Lief 43, Grossbritannien und Irland.—Lief 44, Balkanhalbinsel.—Lief 45, Nordöstliche Vereinigte Staaten und Südöstliches Canada.—Lief 46, Südafrika. Bielefeld und Leipzig: Verlag von Velhagen and Klasing, 1898. *Price 50 pf. each part.*

World. **Frobenius.**

Versuch einer Darstellung der malajo-nigritischen Kultur und ihrer Verwandtschaft, nach ethnologischen Studien von L. Frobenius. *Petermanns Geogr. Mitteilungen*, Jahrgang 1898, Tafel 20. Gotha: Justus Perthes. *Presented by the Publisher.*

World. **Debes.**

E. Debes' neuer Handatlas über alle Teile der Erde in 61 Haupt- und 124 Nebenkarten, mit alphabetischem Namenverzeichnis. Herausgegeben von E. Debes. Zweite vermehrte und verbesserte Auflage. Leipzig: H. Wagner & E. Debes, 1899.

The principal alterations and additions to this atlas are a new physical map of Europe, showing the elevations of the land and depths of the sea, and a map of the Mediterranean sea and the surrounding countries, on which all steamer routes, railways, and telegraphs are laid down, with three insets illustrating meteorology and botany of the Mediterranean basin. The maps which appeared in the former edition have been corrected and brought up to date, and the indices which formerly followed each map have been superseded by a general index at the end of the atlas.

World. **Bartholomew.**

Atlas for South African Schools. A new series of physical and political maps. By J. G. Bartholomew, F.R.G.S. T. Nelson & Sons, London, Edinburgh, and New York. *Price* 1s. *Presented by the Superintendent-General of Education for the Cape Colony.*

The preparation of this atlas was undertaken at the suggestion of the Superintendent-General of Education for the Cape Colony. In addition to the usual general maps to be found in this class of atlas, there are corresponding physical and political maps of continents, and a new map of South Africa in six sections. The physical, relief, and vegetation maps of South Africa are also new.

CHARTS.

United States Charts. **U.S. Hydrographic Office.**

Pilot Charts of the North Atlantic and North Pacific Oceans for January, 1899, and North Atlantic Ocean for December, 1898. Published at the Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

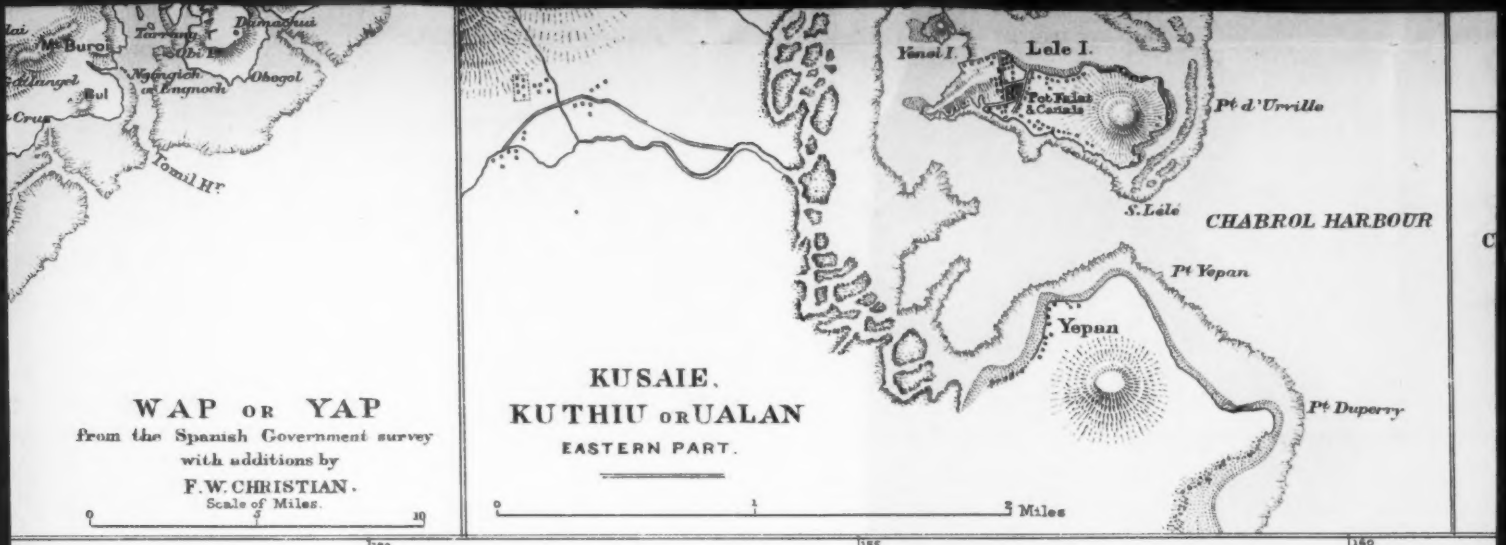
N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

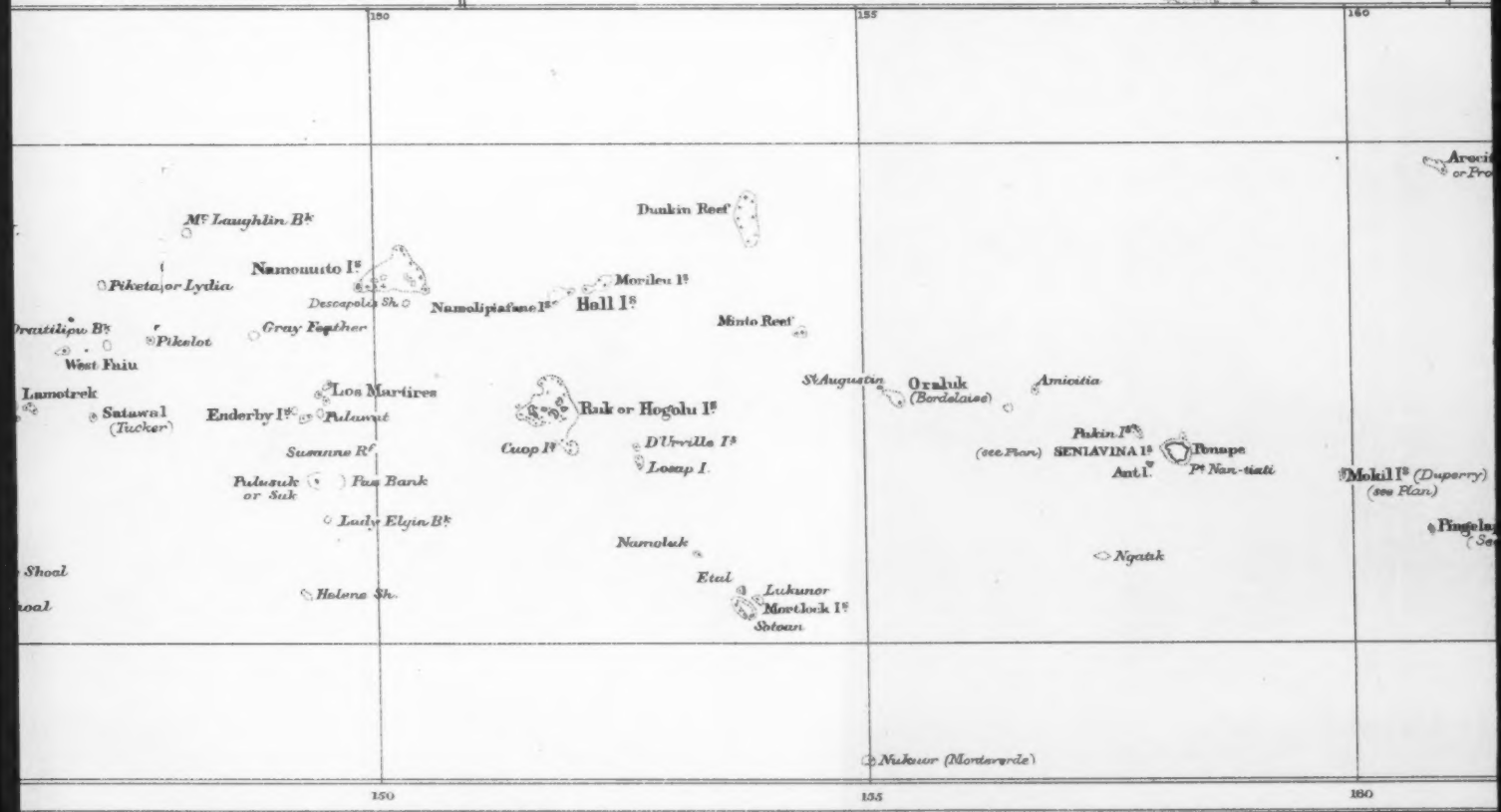
PONAPE OR PONAPEI
from the Spanish Government survey
with additions by
F. W. CHRISTIAN.
Scale of Miles
0
5
10
Nakap en-Parram
Langar I.
Parram I.
Mante Peiti
Santiago
Chokach I.
Mt Not
Mante Peitak
Tapak I.
Mt Paliker
Ascension
Akam
Kadai

Ramung I.
Bulual
Fal
Jan ni Eruach
Malal
Tabak
Tangalathe
Mair I.
Pilai
Palau
Gilitth
Gilewit
Mair
Unean
Isthmus of Gargir
Gatchapa
Plateau 500 ft
Gurur
Adelau
Madolai
Lang
Damachui
Pt de Blois
Yenna I.

Ugai I.
Marton I.
Urak I.

Mt Paliker
CHOKACH
NOT U
Mt Talomir
Tapak I.
Port Aru or Oa
Mt Kupuricha
Machuchau
Mulakaloch
Mt Takai U
Tauak I.
Palang
Mt Tolokom
KITTI
EMIRAU
Palang I.
Tomara
Kitam
Metalanim Hr
Napuli I.
Mt Wanal
Mt Lukoria
Aleniang
Tomun
Nakap I.
Matal
Murau
Kapara I.
Tolotik I.
Ronkia
Ugur
Mt Roi
Nenior I.
Nanipuel I.
Nantamarya
Ponatuk I.
Nalup I.
Namaur I.
Matoh I.
Nantigu Pt
Nalup I
Roch I.
Puniau I
Kadai
Nif
Ilooch
Sea Cruz
Low fertile land
NIMIGUEL
Gal
Nyuri
Umalai or Millai
Lai
Omoth
Elik I.
Gorur
Gorur Pt
135
140
145
Mokomok
Hunter Reef
Uluthi (Mackenzie)
Feys (Tromelin)
Wap or Yap (see Plan)
Grimes I.
Faraulep
Ngoli
Earl Dalhousie
Sorol (Philip I.s)
Olimarao
Elato
Lamotrek
Babelthuap
PALAO or PELEW Is
Uleai Is or Anangai
Ifalik (Wilson I.s)
Angaur I
Eauripik or Kama Is
Ianthe Shoal
Nile Shoal
CAROLINE ISLANDS
Scale of Miles
0
100
200
300
10
5
135
140
145





Published by the Royal Geographical Society.

MOKIL I^{d}

Scale of Miles
0 5 10

PINGELAP I^{s}

10

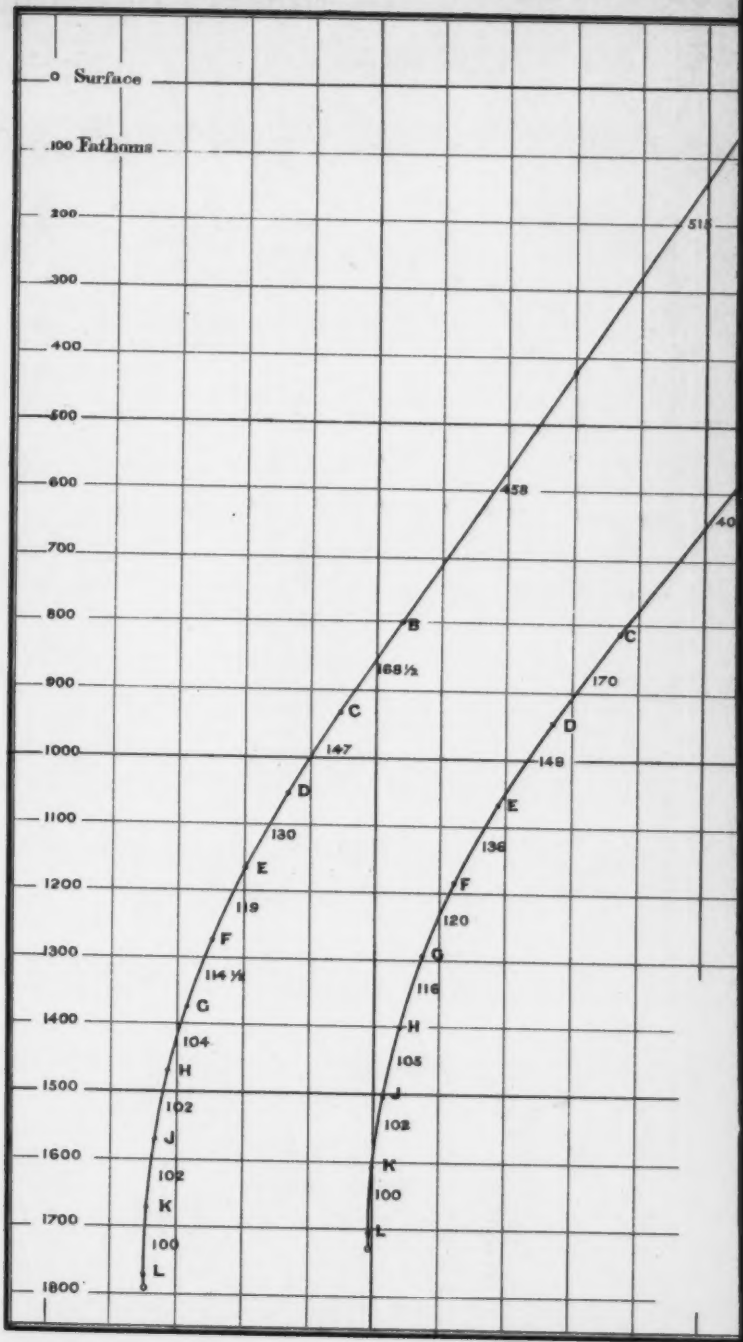
Arrecifos Uyelang
or Providence I.

(Duperry)
Plan.)

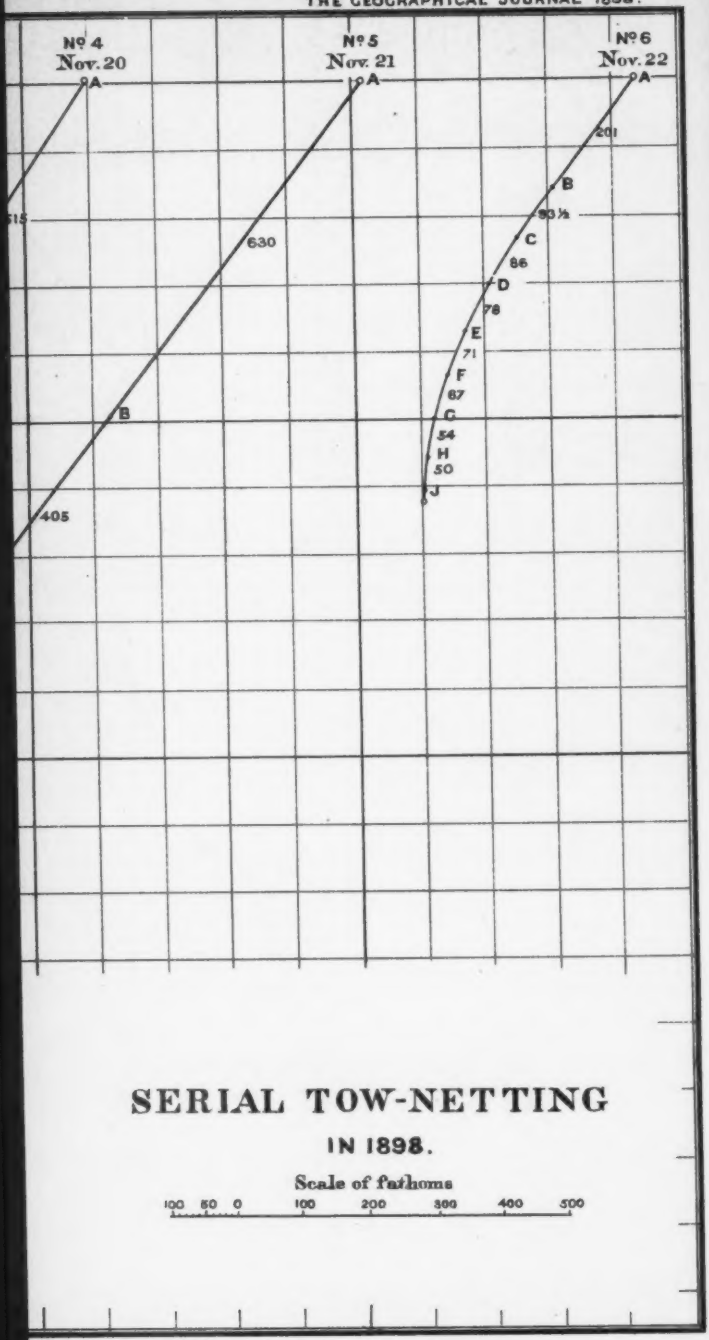
Pingelap (Macaskill)
(See Plan.)

(See Plan.)
Kusaie, Kuthiu
or Ualan I.

5



Published by the Royal Geog



SERIAL TOW-NETTING

IN 1898.

Scale of fathoms

100 50 0 100 200 300 400 500